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ABSTRACT

This document contains a comprehensive instructional program. Overall objectives for the areas of reading, mathematics, science and language arts/English for pre-kindergarten through twelfth grade education levels are presented. It is suggested that each teacher use the objectives as a basis for planning instructional activities and assessment tasks for their students. Hierarchy charts are included to assist teachers in delivering systematic and sequential instruction. (Author/EB)

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Competency-Based Curriculum Guide

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Vincent E. Reed
Superintendent of Schools

UD019242

INTRODUCTION

The impetus for the Competency Based Curriculum of the Public Schools of the District of Columbia derives from the mission statement of the school system.

> To promote excellence by providing a viable and comprehensive instructional program (prekindergarten through twelfth grade) leading to the attainment of knowledge, competencies and skills which upon completion will enable each student to function as a useful citizen.

In fulfillment of this mission, the decision was made that all instruction would focus on the student's acquisition of skills in the following broad categories which promote success in life role functioning:

-Analytical Skills
-Consumer Producer Skills
-Communication Skills
-Social Political Skills
-Self Actualization Skills.

The format of this publication provides for the presentation of the overall objectives for the priority areas of reading, mathematics, science, language arts/English, and as the work of curriculum development progresses, will allow for the inclusion of the complete instructional system for each of the four disciplines. The objectives are being disseminated at this time to inform teachers about the direction in which the curriculum is moving and to promote the implementation of the competency based approach to instruction.

It is suggested that each teacher use the objectives as a basis for planning instructional activities and assessment tasks for their students. The hierarchy charts should prove useful by helping teachers deliver systematic and sequential instruction.

James T. Guines
Associate Superintendent
Office of Instruction

A COMPETENCY BASED CURRICULUM

Reading
Mathematics
Science
Language Arts/English

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

Vincent E. Reed
Superintendent

1978

COMPETENCY BASED CURRICULUM

SCOPE AND SEQUENCE

READING

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

DR. VINCENT E. REED
SUPERINTENDENT
1978

TABLE OF CONTENTS

Introduction ii

	Hierarchy	Code	Page
I.	READING READINESS	RR	1
	Auditory Perception	RR/AP	2
	Visual Perception	RR/VP	3
	Perceptual Motor	RR/PM	5
	Alphabet	RR/A	7
	Word Analysis	RR/WA	8
	Cognitive Skills	RR/CS	9
II.	WORD PERCEPTION	WP	12
	Vocabulary Development	WP/VD	13
	Phonetic Analysis-Consonants	WP/C	15
	Phonetic Analysis-Vowels	WP/V	17
	Structural Analysis	WP/SA	21

	Hierarchy	Code	Page
III.	COMPREHENSION	C	23
	Main Idea	C/MI	24
	Details	C/D	25
	Sequence	C/S	26
	Drawing Conclusions	C/DC	27
	Predicting Outcomes	C/PO	28
	Perceiving Relationships	C/PR	29
	Mood, Character, Plot	C/MCP	31
	Figurative Language	C/FL	32
	Sensory Imagery	C/SI	33
	Critical Thinking	C/CT	35
IV.	STUDY SKILLS	SS	37
	Following Directions	SS/FD	38
	Dictionary	SS/D	39
	Notetaking	SS/N	40
	Outlining	SS/O	41
	Skimming/Scanning	SS/SK	42
	Summarizing	SS/SU	43
	SQ_3R/PQRST	SS/SM	44
	Graphic Aids	SS/GA	45
	Card Catalog	SS/CC	46
	Table of Contents	SS/TC	47
	Index	SS/I	48
	Encyclopedia	SS/E	49
	Bibliography	SS/B	50

PREFACE

The Learner who has mastered the objectives in this guide will be able to:

READ THE NEWSPAPER AND OTHER PRINTED MATERIAL, DEMONSTRATING THE ABILITY TO DETERMINE THE PRONOUNCIATION AND MEANING OF NEW WORDS THROUGH THE UTILIZATION OF WORD ATTACK SKILLS.

INTERPRET THE TECHNICAL VOCABULARY IN CONTENT AREAS SUCH AS HEALTH AND SAFETY, SCIENCE, SOCIAL STUDIES, INDUSTRIAL ARTS, AND DRIVER EDUCATION.

DESCRIBE THE MAIN IDEA IN A SELECTION THROUGH THE USE OF DESCRIPTIVE TITLE CLUES, EXEMPLARY DETAILS, EXPLANATORY DETAILS, AND GRAPHIC AIDS INCLUDED IN THE SELECTION SUCH AS MAPS, CHARTS, GRAPHS AND DRAWINGS.

DISTINGUISH SPECIFIC INFORMATION THROUGH THE COLLECTION, INTERPRETATION AND APPROPRIATE USE OF DATA FROM LIBRARIES, AUDIO-VISUAL AIDS AND OTHER RESOURCE MATERIAL.

FOLLOW DIRECTIONS IN ORDER TO COMPLETE ESSENTIAL APPLICATION FORMS.

READ CRITICALLY TO ASSURE THE APPROPRIATE RESPONSE TO PERFORMANCE TASKS ASSOCIATED WITH INTERVIEWS, DEBATES, AND DISCUSSIONS, AS WELL AS MESSAGE TAKING, RESUME PREPARATION AND TELEPHONE ANSWERING.

DRAW CONCLUSIONS AND MAKE APPROPRIATE JUDGMENTS AND DECISIONS ABOUT THE MATERIAL READ.

This Competency Based Curriculum Scope and Sequence for Reading is a definition of the objectives by which a teacher at any level may prescribe and deliver instruction to insure those skills every student is expected to acquire.

The learning tasks for each objective should be defined and arranged into hierarchies to indicate the learning dependency. Although the skills have been isolated and sequenced, it is not to suggest that instruction should be a sterile, isolated skill development process. As was stated in the Foreword of Sequential Levels of Reading Skills[12], (the curriculum document which preceded this guide), reading is a thinking process with emphasis placed upon the integration rather than an accumulation of isolated skills.

The teacher who properly uses this guide will:

1. assess the students to discover the entry levels of students in the various skill hierarchies using the Prescriptive Reading Tests.

2. plan and execute meaningful classroom activities which promote the upward mobility of students from the level identified in the assessment.

3. plan and execute assessment tasks.

The content is divided into four major areas:

--Reading Readiness includes objectives for those skills which the student must acquire in order to perform successfully in the formal reading instructional process.

--Word Perception presents the series of skill hierarchies for word analysis (phonetic and structural) and vocabulary.

--Comprehension presents the various learning paths (hierarchies) to literal, interpretive and critical thinking and understanding.

--Study Skills arranges the behaviors of effective, independent study into logical learning sequences.

All principles of learning suggest that the acquisition of knowledge is a personal, individual engagement. While individualized instruction is not always appropriate, feasible, desirable or practical, individualized learning is omnipresent. It behooves the teacher to become extremely perceptive of those behaviors which lead to the acquisition of the competencies necessary for students to effectively perform the various life roles. This guide is the first cut of the teacher's major resource to guide the definition, instruction and assessment of those behaviors.

"THE JOURNEY OF A THOUSAND MILES BEGINS WITH THE FIRST STEP"

A C K N O W L E D G E M E N T S

READING CURRICULUM WRITERS
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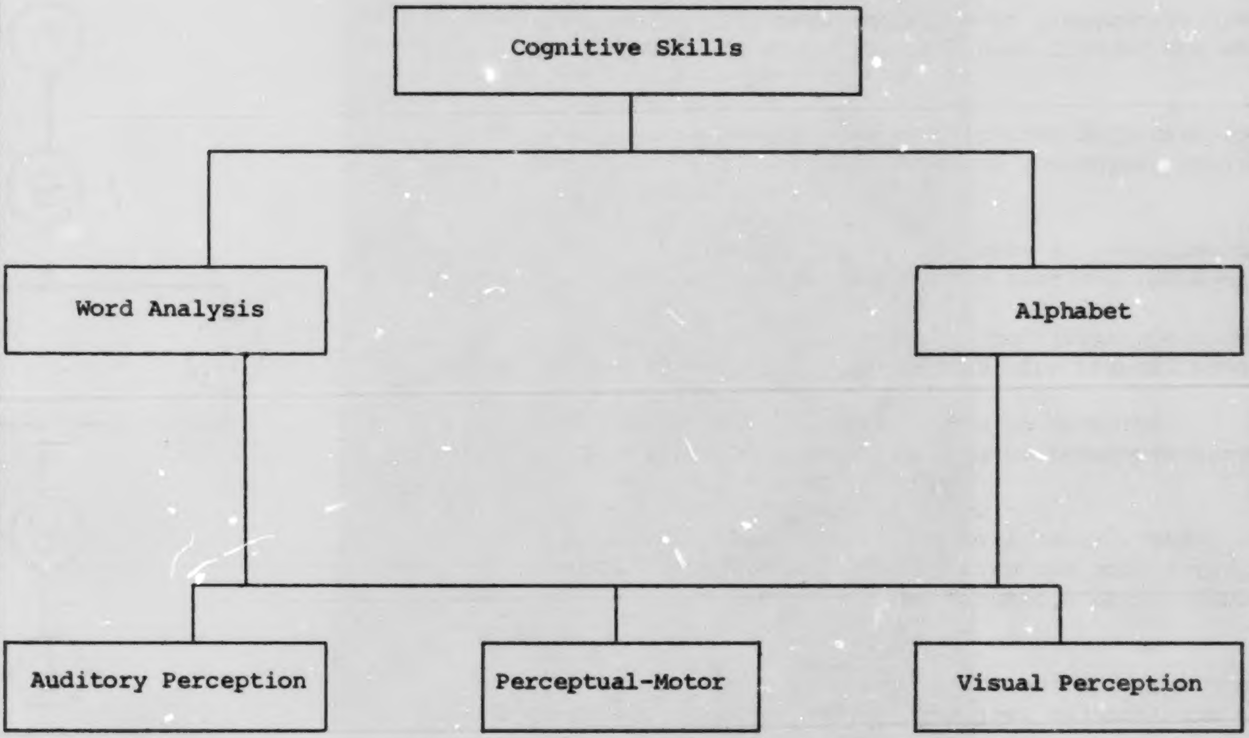
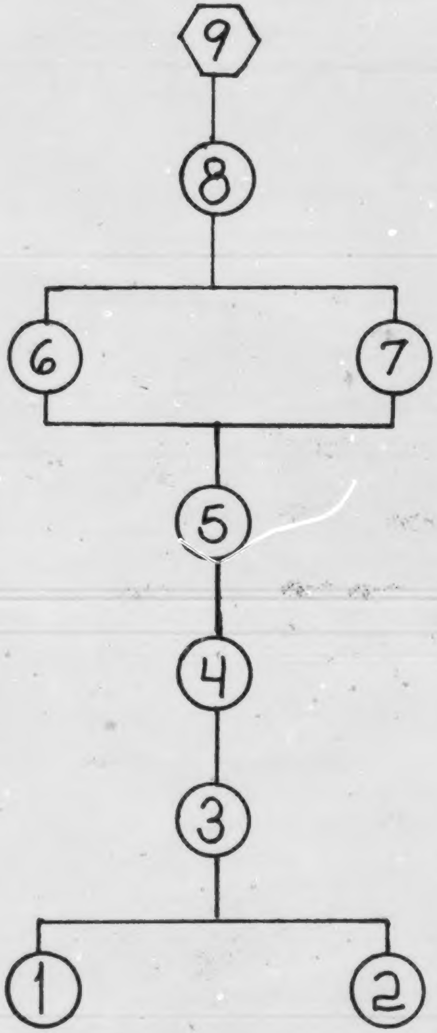
Itinerant Writers	Mrs. Mary Allman	McGogney Elementary
	Mrs. Pinkie Bridges	Friendship Elementary
	Mrs. Alyce Briscoe	Richardson Elementary
	Mrs. Marjorie Buie	Wheatley Elementary
	Mrs. Celeste Burton	Meyer Elementary
	Mrs. Ann Derricotte	Webb Elementary
	Mrs. Lydia Jenkins	Garrison Elementary
	Mrs. P. Yvonne Jones	Webb Elementary
	Mrs. Mary Little	Syphax Elementary
	Mrs. Gloria Morris	Ludlow-Taylor Elementary
	Mrs. Marlene Piscitelli	Bruce-Monroe Elementary
	Mrs. Frances Reed	Brightwood Elementary
	Mrs. Lillian Williams	Raymond Elementary

READING READINESS SCOPE AND SEQUENCE


Cognitive Skills
Word Analysis
Alphabet
Auditory Perception
Perceptual-Motor
Visual Perception

READING READINESS/AUDITORY PERCEPTION

HIERARCHY



BEHAVIORAL OBJECTIVES

RR/AP-1. Given the sound of various familiar objects, the reading readiness student will name the object which is the source of the sound.

RR/AP-2. Given familiar sounds in the student's environment, the reading readiness student will distinguish the sounds for quality (pleasant - unpleasant), intensity (soft - loud), tone (high - low), and duration (long - short).

RR/AP-3. Given a specific sound, the reading readiness student will identify the direction of its origin by pointing.

RR/AP-4. Given a sequence of three sounds, the reading readiness student will demonstrate the ability to duplicate the sounds in sequence.

RR/AP-5. Given the oral presentation of a familiar rhyme or jingle, the reading readiness student will name at least two rhyming words of the verse given.

RR/AP-6. Given the oral presentation of an incomplete familiar rhyme or jingle, the reading readiness student will name the missing rhyming pairs.

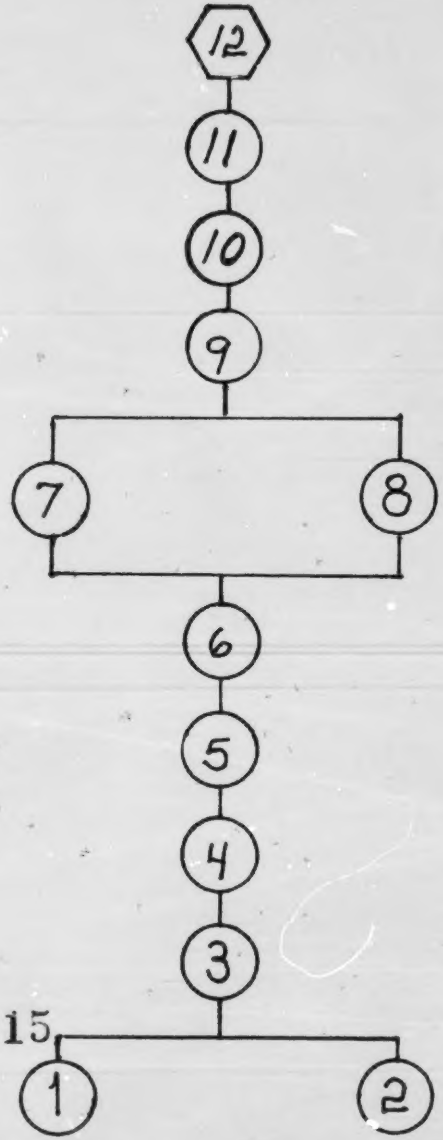
RR/AP-7. Given dictated pairs of words, some rhyming and some non-rhyming, the reading readiness student will distinguish the rhyming pairs.

RR/AP-8. Given the line of a jingle, the reading readiness student will orally construct a second rhyming line.

RR/AP 9 Given the oral presentation of a jingle, the reading readiness student will orally construct at least one other rhyming verse.

READING READINESS/VISUAL PERCEPTION

HIERARCHY



BEHAVIORAL OBJECTIVES

RR/VP-1. Given objects familiar to the environment, the reading readiness student will identify the specified objects in the surrounding environment.

RR/VP-2. Given various articles collected from different sources, the reading readiness student will distinguish the articles and identify their sources.

RR/VP-3. Given two objects identical in color and one object of a different color, the reading readiness student will distinguish the identical colors.

RR/VP-4. Given an assortment of three pairs of identical objects and two single objects, the reading readiness student will identify the identical objects.

RR/VP-5. Given sets of two objects, differing in size, (small - large), the reading readiness student will distinguish the larger/smaller object.

RR/VP-6. Given a set of designs containing identical pairs, the reading readiness student will distinguish matching pairs.

RR/VP-7. Given a diagram of basic shapes, (circle, triangle, rectangle, square), the reading readiness student will identify the shapes.

RR/VP-8. The reading readiness student will distinguish basic shapes in his environment.

RR/VP-9. Given a familiar story book, the reading readiness student will name the title of the book.

RR/VP 10. Given a familiar object or a picture of an object with a missing part, the student will construct the missing part.

HIERARCHY

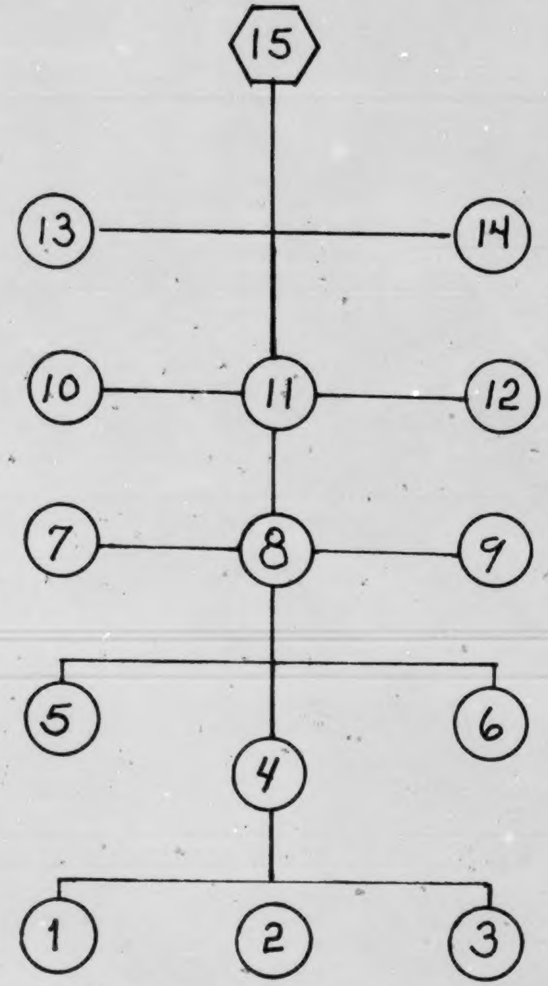
BEHAVIORAL OBJECTIVES

RR/VP-11. Given a set of like and unlike objects, the reading readiness student will distinguish the like/unlike sets.

RR/VP 12 Given a set of objects possessing common characteristics related to color, shape, size, size texture, the reading readiness student will construct sets according to common characteristics.

READING READINESS/Perceptual Motor

Hierarchy



Behavioral Objectives

RR/PM-1. Given basic musical patterns (4/4, 2/4, 3/4 timing), the reading readiness student will demonstrate auditory and muscular coordination by moving to the rhythmic tempo. (Auditory-Muscular Coordination)

RR/PM-2. Given various manipulative objects (clay, chalk, rubber ball, small box), the reading readiness student will demonstrate finger control by manipulating each object according to its appropriate use. (Finger Control)

RR/PM-3. Given a designated goal or target, the reading readiness student will demonstrate eye-hand coordination by moving the hand and eyes along the designated path to the goal or target. (Eye-Hand Coordination)

RR/PM-4. Given forms or patterns and oral directions, the reading readiness student will construct replicas. (Construct Replicas)

RR/PM-5. Given various paths and patterns, the reading readiness student will construct a left-to-right progression on the paths and patterns. (Left-To-Right Progression)

RR/PM-6. Given oral directions, the reading readiness student will demonstrate left-to-right directionality in hand and/or body movement using the page of a book. (Left-To-Right Directionality/Written Page)

RR/PM-7. Given objects and oral directions specifying spatial relationships of one object to another, the reading readiness student will describe the location of the objects. (Describe Spatial Relations)

RR/PM-8. Given an object, the reading readiness student will distinguish spatial relationships pertaining to the object itself. (Distinguish Spatial Relations)

READING READINESS/Perceptual Motor

Behavioral Objectives

RR/PM-9. Given the designation of one cardinal direction or position (north is indicated), the reading readiness student will identify the three remaining positions. (Identify Positions)

RR/PM-10. Using visual memory of the formation of common geometric shapes (Circle, Triangle, square, rectangle), the reading readiness student will construct common geometric forms by defining their perimeters. (Construct Geometric Forms)

RR/PM-11. Given pictures and oral directions for identifying pictures, the reading readiness student will identify the designated picture. (Identify Pictures)

RR/PM-12. Given a picture and/or oral events in a story, the reading readiness student will describe the main idea of the story. (Describe Main Idea)

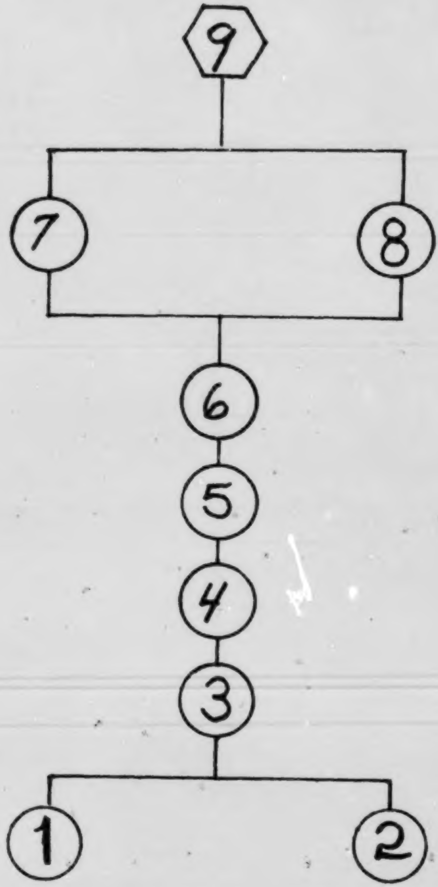
RR/PM-13. Given a page of pictured objects including familiar test-taking symbols, the reading readiness student will identify symbols as directed. (Identify Testing Symbols)

RR/PM-14. Given a two-step oral direction, the reading readiness student will demonstrate following directions by completing the steps in the order stated. (Follow Two-Step Directions)

RR/PM-15 Given a row or line of concrete objects, the reading readiness student will describe the geometric characteristics and the spatial relationships of the objects. (Describe Shapes and Spatial Relations)

READING READINESS/Alphabet

Hierarchy



Behavioral Objectives

RR/A-1. Given an oral presentation of the alphabet, the reading readiness student will construct the alphabet in sequential order. (Construct Alphabet)

RR/A-2. Given a printed sequence of the capital lower case letters of the alphabet and an oral presentation of the alphabet, the reading readiness student will identify the printed letters of the alphabet in sequential order. (Identify Letters of Alphabet)

RR/A-3. Given a set of capital lower case letters and other media such as sand, grits, plasticene, or textured cards made from velvet, terry cloth, etc., the reading readiness student will construct the matching capital letters. (Construct Matching Capital Letters)

RR/A-4. Given the printed name of a student, the reading readiness student will orally construct the name of that student. (Construct Student Names)

RR/A-5. Given the capital and lower case letters of the alphabet, the reading readiness student will construct matching pairs. (Construct Matching Letter Pairs)

RR/A-6. Given a group of letters containing pairs of similar configuration such as: LI, li, bd, pq, wm, un, the reading readiness student will identify each letter in the pair. (Identify Letters in Pairs)

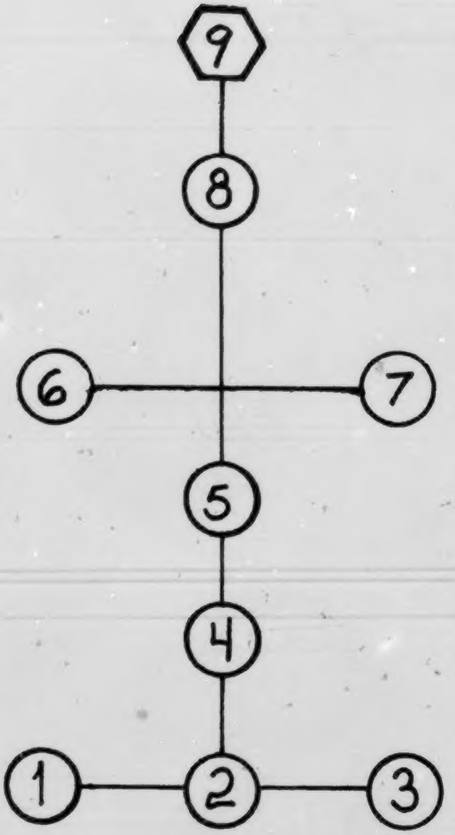
RR/A-7. Given a random presentation of upper and/or lower case letters of the alphabet, the reading readiness student will name the letters. (Name Letters of Alphabet)

RR/A-8. Given a letter or combination of letters, the reading readiness student will construct the preceding and/or following letter or letters of the alphabet. (Construct Letters of Alphabet)

RR/A-9. Given letters in random order, the reading readiness student will order the upper and lower case letters in sequential order. (Order Upper and Lower Case Letters)

READING READINESS/WORD ANALYSIS

HIERARCHY



BEHAVIORAL OBJECTIVES

RR/WA-1. Given dictated words of frequent use, with a single consonant sound in the initial position, the reading readiness student will identify the initial consonant sound.

RR/WA-2. Given a familiar object, the reading readiness student will orally construct the initial consonant sound of the name of the object.

RR/WA-3. Given objects whose names have initial consonant diagraphs (ch, sh, wh, th), the reading readiness student will orally construct the initial consonant diagraph sound in the name of the object.

RR/WA-4. Given a picture of an object and the printed initial consonant letter, the reading readiness student will say the name of the pictured object and the initial consonant sound.

RR/WA-5. Given a printed consonant letter, the reading readiness student will construct the consonant sound.

RR/WA-6. Given dictated words, the reading readiness student will identify the final consonant sound.

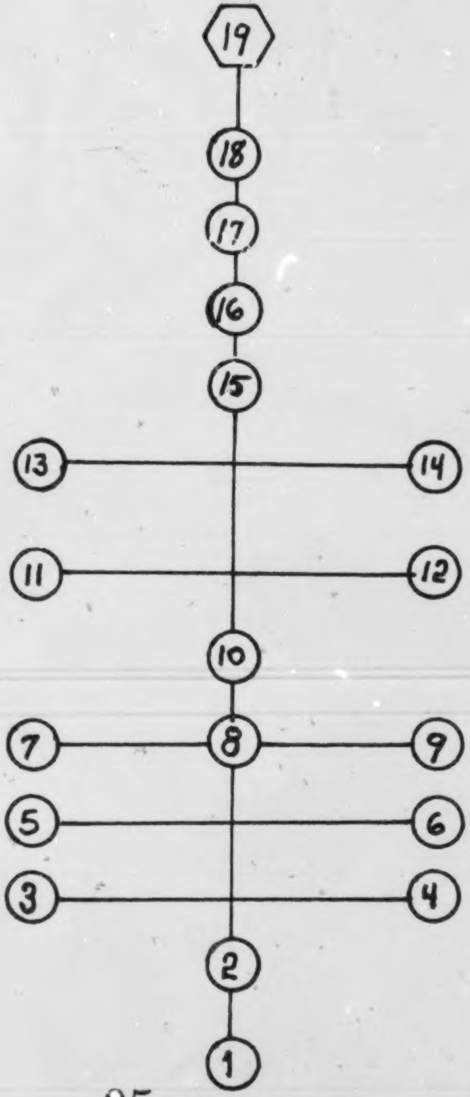
RR/WA-7. Given a visual presentation, mime, objects or pictures, the reading readiness student will identify inflectional endings. (s, -es, -ed, -ing)

RR/WA-8. Given printed words of dissimilar initial consonant letters, the reading readiness student will identify the word, when dictated, by use of initial consonant letter clue.

RR/WA-9. Given a printed consonant letter, the reading readiness student will name at least three words containing the sound of the printed letter, and identify the position of the sound in the word.

READING READINESS/COGNITIVE SKILLS

HIERARCHY



BEHAVIORAL OBJECTIVES

RR/CS-1. Given a story title or picture appropriate to a current interest for discussion, the reading readiness student will orally describe what he/she sees, hears or thinks, using complete sentences.

RR/CS-2. Given pictures and written sight words which name the pictures, the reading readiness student will distinguish the words which name the pictures.

RR/CS-3. Given concrete objects for which comparisons and contrasts of properties can be made, the reading readiness student will describe the comparisons and contrasts of the properties of the objects.

The description may include physical attributes, actions, musical tones, rhythmic and melodic patterns, letters, numerals and/or words (comparison/contrast).

RR/CS-4. Given oral questions whose answers are essential information related to individual identification, the reading readiness student will orally construct an accurate response for each question in complete sentences.

RR/CS-5. The reading readiness student will construct patterns of colors, numbers, shapes, letters, and sentences. Each pattern should be labeled.

RR/CS-6. Given an assortment of objects/pictures, the reading readiness student will order a group of objects using two criteria simultaneously.

RR/CS-7. Given an oral presentation of a nursery rhyme, poem, or story followed by related questions, the reading readiness student will orally order the events by responding to questions about the sequence.

READING READINESS/COGNITIVE SKILLS

HIERARCHY

BEHAVIORAL OBJECTIVES

RR/CS-8. Given an oral presentation of a story, the reading readiness student will orally order the story events in sequence using complete sentences.

RR/CS-9. Given dictated incomplete sentences, the reading readiness student will demonstrate the use of context clues to determine meaning by constructing missing words to complete the sentences. The sentences must be logical, complete ideas.

RR/CS-10. Given pictures and oral questions related to spatial relationships, the reading readiness student will describe the spatial relationship presented in the picture.

RR/CS-11. Given a set of pictures with opposite qualities or characteristics, the reading readiness student will distinguish likenesses and differences by matching pictures and/or words with their opposites.

RR/CS-12. Given an oral presentation of a poem or story, the reading readiness student will identify the main idea and/or characters.

RR/CS-13. Given an oral presentation of a story with no ending, the reading readiness student will construct an ending to the story. The ending must be a probable concluding event.

RR/CS-14. Given various illustrations of human interaction in pictures, nursery rhymes or stories, the reading readiness student will describe the mood depicted in the illustrations.

RR/CS-15. Given objects or pictures of objects whose properties require the use of the five senses, the reading readiness student will distinguish them according to the five senses.

RR/CS-16. Given illustrations containing cause and/or effect elements, the reading readiness student will describe cause and/or effect relationships.

READING READINESS/COGNITIVE SKILLS

HIERARCHY

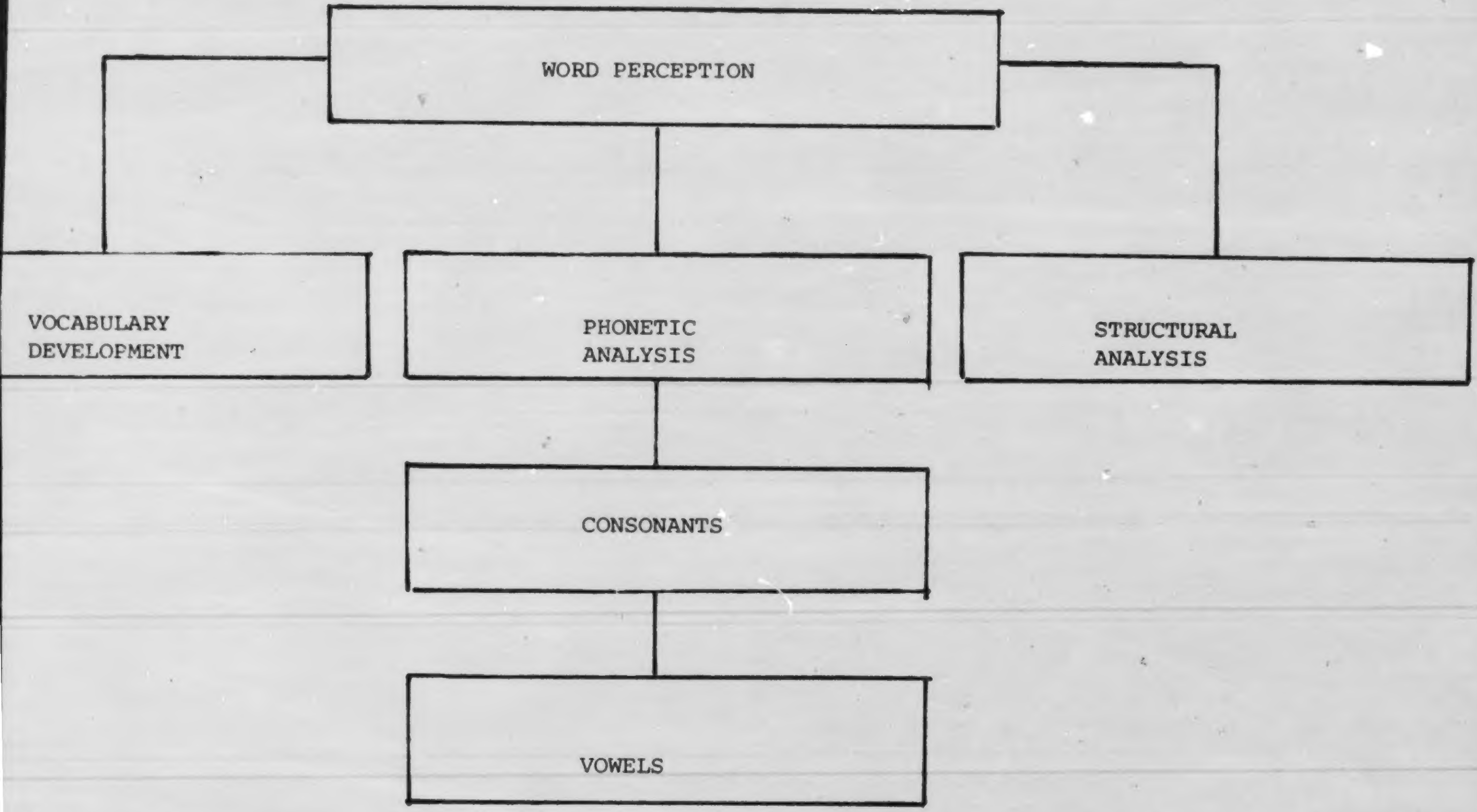
BEHAVIORAL OBJECTIVES

RR/CS-17. Given illustrations containing fact or fantasy elements, the entry level student will distinguish fact from fantasy.

RR/CS-18. Given pictures or an experience, the reading readiness student will orally construct a logical story sequence.

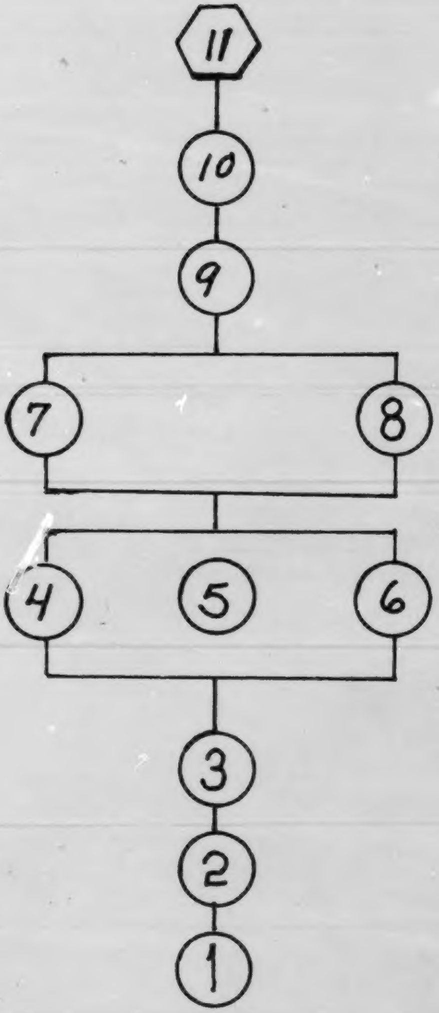
RR/CS-19 The reading readiness student will construct a prediction of a simple rule and test it.

WORD PERCEPTION SCOPE AND SEQUENCE


WORD PERCEPTION
VOCABULARY DEVELOPMENT
PHONETIC ANALYSIS
STRUCTURAL ANALYSIS
CONSONANTS
VOWELS

WORD PERCEPTION/VOCABULARY DEVELOPMENT

HIERARCHY



BEHAVIORAL OBJECTIVES

WP/V-1. Given common nouns and basic sight words appropriate to the content and level, the learner will identify the words by sight with 95% accuracy. (Sight Words)

WP/V-2. Given words of similar configuration, the learner will distinguish the words by pronouncing and defining them. (Configuration)

WP/V-3. Given incomplete sentences and a list of sight words, the learner will distinguish the words by using context clues which best completes the sentences. (Context Clues)

WP/V-4. Given words among which there is an antonym for each word, the learner will distinguish the antonyms. (Antonyms)

WP/V-5. Given words among which there is a synonym for each word, the learner will distinguish the synonyms. (Synonyms)

WP/V-6. Given words among which there are homonyms for each word, the learner will distinguish the homonyms. (Homonyms)

WP/V-7. Given heteronyms, the learner will describe two meanings. (Heteronyms)

WP/V-8. Given words with multiple meanings (homographs), the learner will describe at least two meanings for each word. (Homographs)

WP/V-9. Given word parts (affixes, rootwords), the learner will construct words with sematical variations.

WP/V-10. Given a selection containing key words and concepts relative to the technical vocabulary of the content, the learner will describe the meanings as they are used in the selection. (Technical Vocabulary)

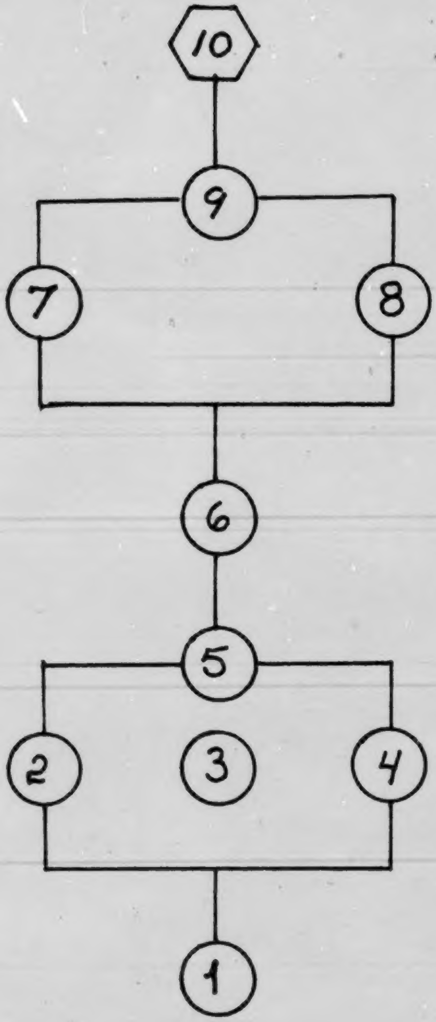
HIERARCHY

BEHAVIORAL OBJECTIVES

WP/V 11 Given a reading selection with designated words for which denotative and connotative meanings can be described, the learner will distinguish the denotative and connotative meaning of the designated words. (Denotation and Connotation)

WORD PERCEPTION/Consonants

Hierarchy



Behavioral Objectives

WP/C-1. Given consonant letter names, the learner is able to identify the consonant sound and corresponding symbol with 95% accuracy. (Identify the Consonant Sound)

WP/C-2. Given dictated words stressing single initial consonant sounds, the learner is able to identify the corresponding symbol by letter name. (Identify Corresponding Letter Symbols)

WP/C-3. Given dictated words stressing single *final* consonant sounds, the learner is able to identify the corresponding symbol of each final consonant sound. (Identify Corresponding Final Consonant Sounds)

WP/C-4. Given words selected for consonant sounds in medial position, the learner will identify consonant sounds. (Identify Consonant Sounds)

WP/C-5. Given dictation of keywords with consonants in initial, medial and final position, the learner will *distinguish consonant sounds*. (Distinguish Consonant Sounds)

WP/C-6. Given words illustrative of the two sounds of *c* and *g*, the learner will apply the rules to distinguish the two sounds of *c* and the two sounds of *g* with 95% accuracy. (Distinguish *c* and *g*)

WP/C-7. Given words with consonant clusters, the learner will identify and distinguish sounds of consonant clusters with 80% accuracy. (Identify Consonant Clusters)

WP/C-8. Given selected words, the learner will identify and distinguish consonant digraph sounds. (Identify and Distinguish Consonant Digraph Sounds)

WP/C-9. Given words with silent letter combinations and phonetic irregularities (honor, psalm, glimpse, light), the learner will apply the rules for decoding phonetic irregularities. (Phonetic Irregularities)

WORD PERCEPTION/Consonants

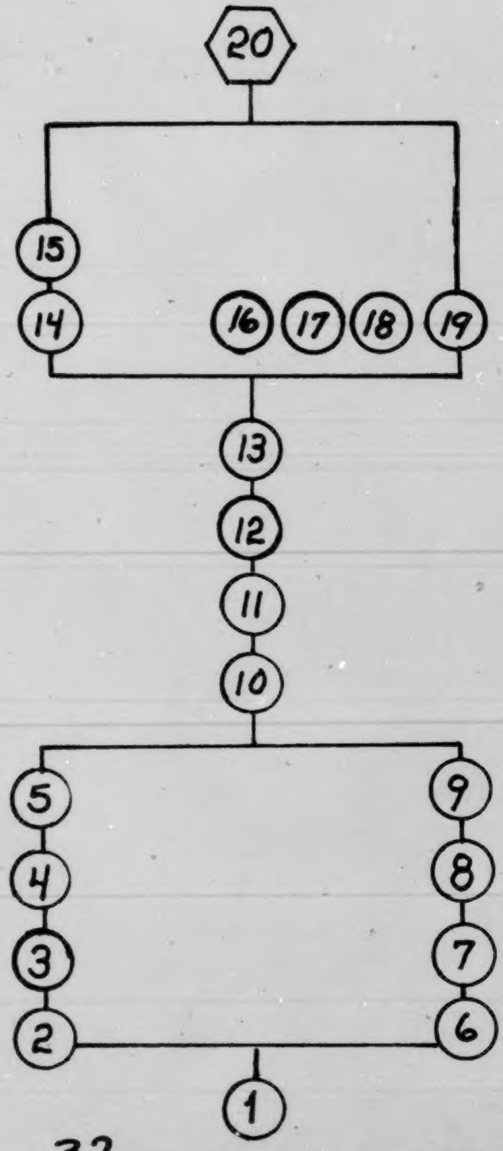
Hierarchy

Behavioral Objectives

WP/C-10. Given a selection illustrative of various consonant sounds in phonetic, initial, medial and final positions and irregularities, the learner will demonstrate knowledge of consonant sound-symbol relationships and principles by reading the selection with 100% accuracy. (Consonant Sound/Symbol Relationships)

WORD PERCEPTION/Vowels

Hierarchy



Behavioral Objectives

WP/Vow-1. Given the letters of the alphabet, the learner will identify the vowel letter names by symbols. (Identify Vowel Letter Names)

WP/Vow-2. Hearing words which contain short vowel sounds in the initial position, the learner will identify the short vowel sounds. (Identify Initial Short Vowel Sounds)

WP/Vow-3. Seeing words which contain short vowel sounds in the initial position, the learner will apply the Vowel-Consonant (VC) Principle. Example: (me, go). (Apply VC Principle)

WP/Vow-4. Hearing words which contain the short vowel sounds in the medial position, the learner will identify the short vowel sounds. (Identify Medial Short Vowel Sounds)

WP/Vow-5. Seeing words which contain short vowel sounds in the medial position, the learner will apply the Consonant-Vowel-Consonant Principle. (Apply CVC Principle)

WP/Vow-6. Hearing one syllable words which contain long vowel sounds in the medial and final e positions, the learner will identify the long vowel sounds. (Identify Medial Long Vowel Sounds)

WP/Vow-7. Given words which contain long vowel sounds in the medial position with final e, the learner will apply the Consonant-Vowel-Consonant-Final e (CVCe) Principle. (Apply CVCe Principle)

WP/Vow-8. Hearing words which contain one vowel at the end of a word or syllable, the learner will identify the final long vowel sounds. (Identify Final Long Vowel Sounds)

WP/Vow-9. Given words which contain one vowel at the end of a word or syllable, the learner will apply the Consonant-Vowel (CV) Principle. (Apply CV Principle)

WORD PERCEPTION/Vowels

Hierarchy

Behavioral Objectives

WP/Vow-10. Given words containing long and short vowel sounds, the learner will distinguish which words have long sounds and those that have short sounds. (Distinguish Long and Short Vowel Sounds)

WP/Vow-11. Given words which contain vowel digraphs in the medial position, the learner will identify the letters and sounds which represent the digraphs. (Identify Digraphs)

WP/Vow-12. Given words which contain vowel digraphs in the medial position, the learner will apply the rule for the CVVC letter pattern. (Apply CVVC Vowel Principle)

WP/Vow-13. Given words which conform to the five letter patterns (VC, CVC, CVCe, CV, CVVC), the learner will apply the vowel rules. (Apply VC, CVC, CVCe, CV, CVVC Principles)

WP/Vow-14. Given words which contain "y" as a consonant and "y" as a vowel, the learner will distinguish between "y" as a vowel or consonant. (Distinguish "Y" as a Vowel or Consonant)

WP/Vow-15. Given words which contain "y" as a vowel, the learner will distinguish the long "i" sound or long "e" sound of "y". (Distinguish Long "I" and Long "E" Sounds of Y)

WP/Vow-16. Given words containing dipthongs, the learner will name which letters form the diphthong and read the word. (Name Diphthongs)

WP/Vow-17. The learner will identify the schwa (soft unstressed) sounds in given words. Example: (ago, salad, focus, April) (Identify Schwa Sounds)

WP/Vow-18. Given words which contain irregular vowel sound patterns, the learner will identify the phonetically irregular words. Example: (bread, some, kind). (Identify Phonetically Irregular Words.

WORD PERCEPTION/Vowels

Hierarchy | **Behavioral Objectives**

WP/Vow-19. Given words containing vowels controlled by "r" (ir-ur-er-or-ar), the learner will identify the letters and sounds which represent the vowel plus "r". (Identify R-Controlled Vowels)

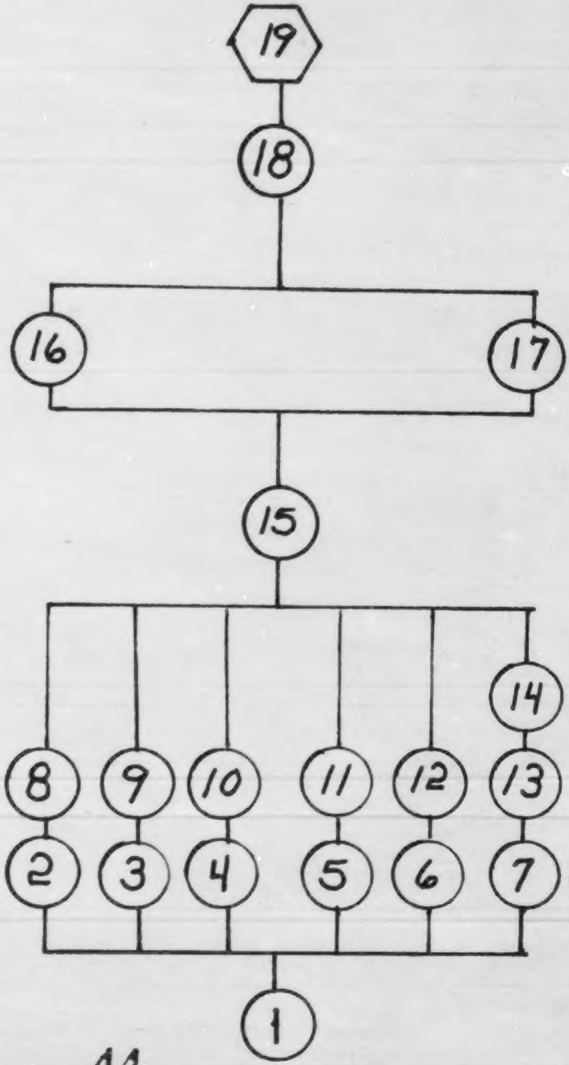
WP/Vow 20 Given a passage, the learner will demonstrate the ability to read the words which conform to phonetic vowel patterns and to irregular vowel principles.
(Demonstrate the Ability to Decode Vowel Sounds)

STRUCTURAL ANALYSIS

43

WORD PERCEPTION/Structural Analysis

Hierarchy



Behavioral Objectives

WP/SA-1. Given sight words, the learner will identify the root words. (Identify Root Words)

WP/SA-2. Given words with inflectional endings and descriptive pictures, the learner will identify inflectional endings. (Identify Inflectional Endings)

WP/SA-3. Given words with prefixes, the learner will identify prefixes. (Identify Prefixes)

WP/SA-4. Given words with suffixes, the learner will identify suffixes. (Identify Suffixes)

WP/SA-5. Given words, some of which may be compounds, the learner will identify compounds. (Identify Compound Words)

WP/SA-6. Given oral sentences showing possession, the learner will identify those words indicating ownership. (Identify Possessives)

WP/SA-7. Given a group of words which include contractions, the learner will identify the contractions. (Identify Contractions)

WP/SA-8. Given incomplete sentences and words requiring inflectional endings, the learner will state a rule for adding the inflectional ending and complete the sentence. (Rule for Inflectional Endings)

WP/SA-9. Given root words and a choice of prefixes, the learner will construct words having prefixes. (Construct Prefixes)

WP/SA-10. Given root words and a choice of suffixes, the learner will construct words having suffixes. (Construct Suffixes)

WORD PERCEPTION/Structural Analysis

Hierarchy

Behavioral Objectives

WP/SA-11. Given pictures and words that may be combined to form compound words, the learner will construct the compound words. (Construct Compound Words)

WP/SA-12. Given groups of words that express ownership, the learner will construct the possessive form of the words. (Construct Possessive Forms)

WP/SA-13. Given a selection containing incomplete sentences and a list of words that can be combined to form contractions, the learner will construct contractions. (Construct Contractions)

WP/SA-14. Given one, two, or three syllable words, the learner will identify the syllables of each word. (Identify Syllables)

WP/SA-15. Given a list of words, the learner will apply the vowel-consonant-vowel syllabication rules. (Apply VCV Rule)

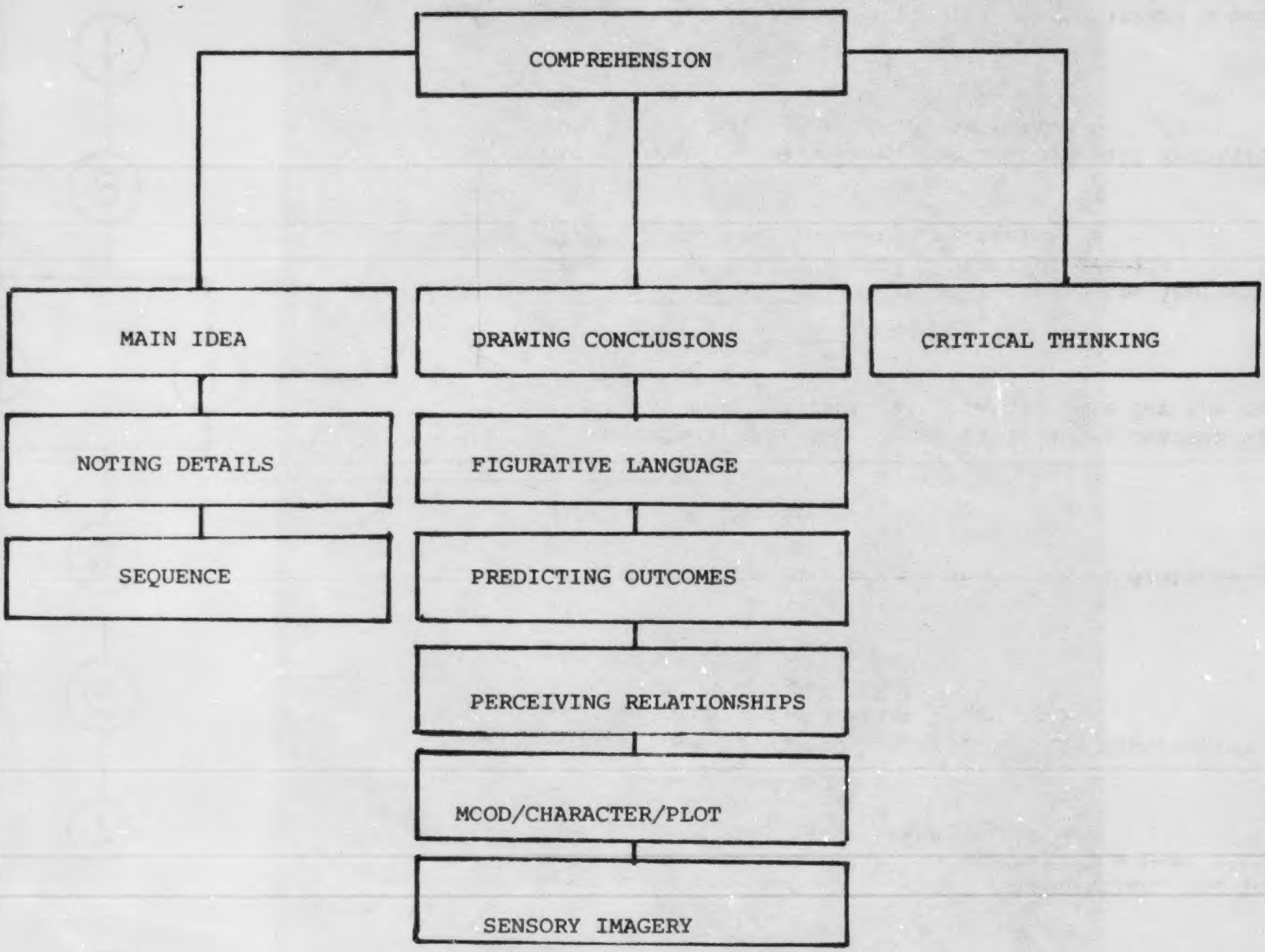
WP/SA-16. Given a list of words, the learner will apply the vowel-consonant-consonant-vowel syllabication rules. (Apply VCCV Rule)

WP/SA-17. Given a list of words including some that are exceptions to the syllabication principles, the learner will identify those words that are exceptions to syllabication principles. (Identify Syllabic Exceptions)

WP/SA-18. Given a list of words, the learner will apply rules for accenting words (compounds, like syllables, "le," vowel in open and closed syllables). (Apply Rule for Accenting Words)

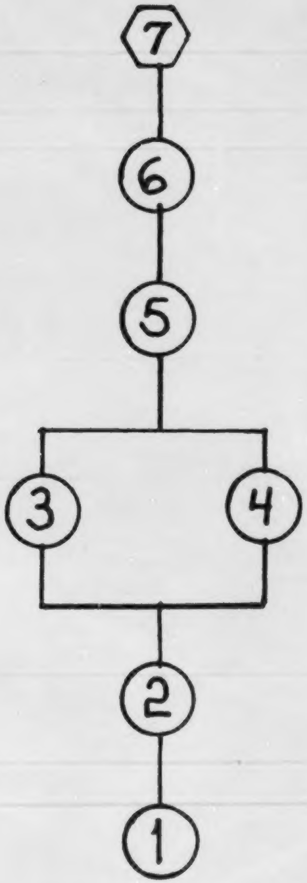
WP/SA 19 Given words reflecting the various word structures, the learner will demonstrate the ability to analyze words using syllabication, accentuation, and structural principles. (Analyze Words)

COMPREHENSION SCOPE AND SEQUENCE


COMPREHENSION
MAIN IDEA
DRAWING CONCLUSIONS
CRITICAL THINKING
NOTING DETAILS
FIGURATIVE LANGUAGE
SEQUENCE
PREDICTING OUTCOMES
PERCEIVING RELATIONSHIPS
MCOD/CHARACTER/PLOT
SENSORY IMAGERY

COMPREHENSION/MAIN IDEA

NETWORK



BEHAVIORAL OBJECTIVES

C/M-1. Given a picture and a choice of three titles, the learner will distinguish the main idea by selecting the best title.
(Distinguish Main Idea from Picture)

C/M-2. Given a poem or story, the learner will distinguish key facts in the context by answering questions:
(Who, What, When, Why, How).
(Distinguish Key Facts)

C/M-3. Given a short paragraph, the learner will distinguish details which support the main idea.
(Distinguish Details)

C/M-4. Given a short story and three titles, the learner will distinguish the best inferentially stated title for the main idea.
(Distinguish Inference)

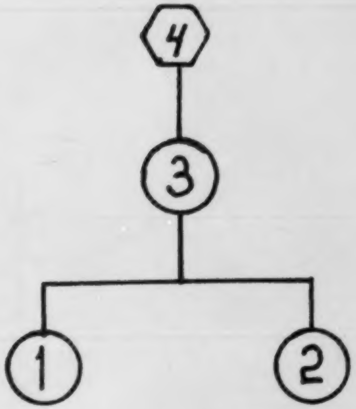
C/M-5. Given a story and a list of statements, the learner will distinguish the main idea and supporting details.
(Distinguish Main Idea and Details)

C/M-6. Given a reading selection, the learner will identify the location of the main idea in the selection.
(Locate Main Idea)

C/M⟨7⟩ The learner will construct (orally or written) a main idea and supporting details.
(Construct Main Idea and Details)

COMPREHENSION/NOTING DETAILS

NETWORK



BEHAVIORAL OBJECTIVES

C/ND-1. Given a picture story and a list of questions related to details in the picture, the learner will identify the pictorial details to answer the questions.

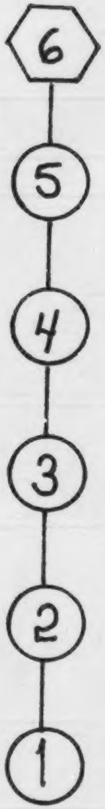
C/ND-2. Given an oral presentation of a story and questions related to details in the story, the learner will name the details by answering the questions.

C/ND-3. Given paragraphs and a random list of supporting details, the learner will identify details for each paragraph.

C/ND4. Given the main idea, the learner will construct details which support the main idea.

COMPREHENSION/Sequence

Hierarchy



Behavioral Objectives

CS-1. Given real or vicarious experiences, the learner will order the experiences in the sequence in which they occurred. (Order Experiences)

CS-2. Given randomly arranged pictures from a known story, the learner will order the pictures. (Order Picture Story Sequence)

CS-3. Given a series of words in random order (days of the week, months of the year, etc.), the learner will order the words. (Order Words in a Series)

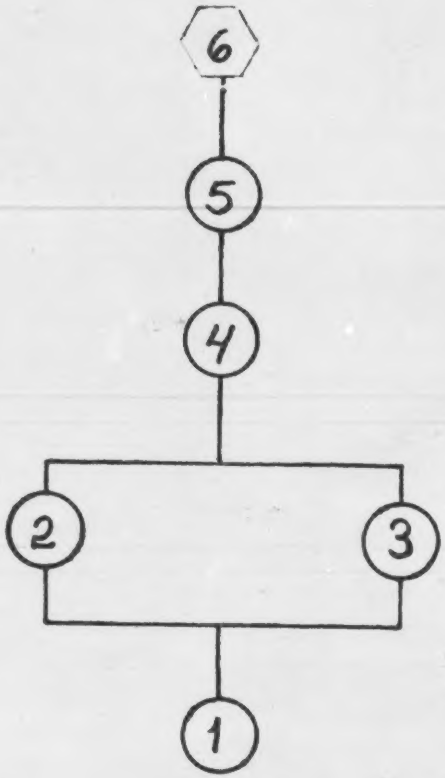
CS-4. Given paragraphs, followed by a random list of statements, the learner will order, by numbering, the statements according to their occurrence in the selection. (Sequence of Events)

CS-5. Given a narrative passage with time sequence relationship, and a list of events out of sequence, the learner will order the events in chronology. (Chronological Order)

CS-6. Given several randomly arranged related paragraphs with important events, the learner will construct a time line of events. (Time Order Sequence)

COMPREHENSION/Conclusions

Hierarchy



Behavioral Objectives

C/C-1. The learner will describe the characteristics of a conclusion. (Describe Conclusion)

C/C-2. Given an oral presentation of a short story or poem, the learner will identify the conclusion of the story or poem. (Identify Conclusion)

C/C-3. Given an oral presentation of a short story or poem, with choices of endings, the learner will distinguish the most logical conclusion. (Distinguish Conclusions)

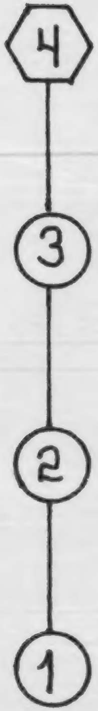
C/C-4. Given a story or poem, the learner will describe the conclusion. (Describe Conclusions)

C/C-5. Given an incomplete story or poem, the learner will construct a logical conclusion. (Construct Story Conclusion)

C/C6 Given graphic/statistical data, the learner will construct logical conclusions from the data using information from the data to justify the logic. (Construct and Justify Conclusions from Graphics)

COMPREHENSION/Predicting Outcomes

Hierarchy



Behavioral Objectives

C/PO-1. Given a set of pictures about a story, the learner will name the outcome orally. (Naming Outcomes)

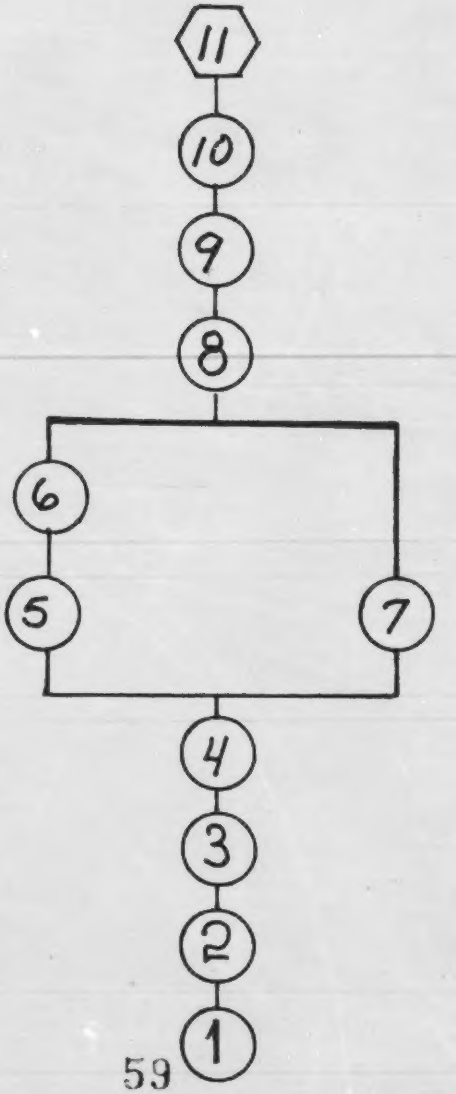
C/PO-2. Given unfinished paragraphs and possible outcomes, the learner will distinguish the most logical outcome. (Distinguish Outcomes)

C/PO-3. Given statements from which outcomes have been omitted, the learner will describe the most logical outcome. (Describe Outcomes)

C/PO 4 Given an unfinished passage, the learner will construct a logical outcome with justification from the unfinished passage. (Construct Outcomes)

COMPREHENSION/Perceiving Relationships

Hierarchy



Behavioral Objectives

C/PR-1. Given a variety of pictures and objects, the learner will describe characteristics of the (concepts of) relationships.
(Describe Characteristics of Relationships)

C/PR-2. Given incomplete analogous sentences with related words, the learner will distinguish the word that completes the analogy.
(Distinguish Analogy)

C/PR-3. Given analogies, the learner will describe the relationships.
(Describe Analogies)

C/PR-4. Given incomplete analogous sentences, the learner will construct analogies to complete the sentences. (Construct Analogies)

C/PR-5. Given an event or story having cause and effect relationships, the learner will distinguish cause and effect events.
(Distinguish Cause and Effect)

C/PR-6. Given paragraphs having cause and effect relationships, the learner will describe the cause and effect events.
(Describe Cause and Effect)

C/PR-7. Given words which denote time and order, the learner will order the words to show their relationships. (Order Time Relationships)

C/PR-8. Given sentences, each containing an inconsistent word, the learner will identify the inconsistent words.
(Identify Consistency/Inconsistency)

C/PR-9. Given paragraphs, each containing an inconsistent idea, the learner will describe the inconsistent/consistent idea.
(Describe Consistency/Inconsistency)

COMPREHENSION/Perceiving Relationships

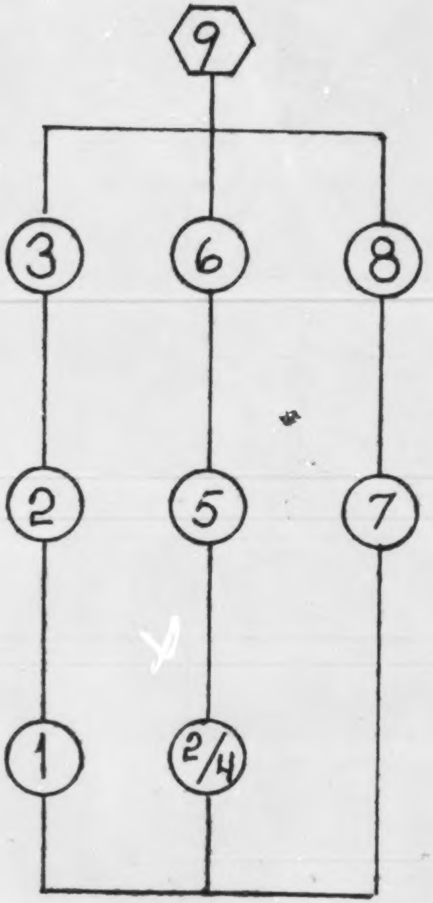
Hierarchy | **Behavioral Objectives**

C/PR-10. Given paragraphs with one or more irrelevant ideas, the learner will identify the irrelevant ideas. (Identify Relevance/Irrelevance)

C/PR 11 Given a passage with one or more irrelevant ideas and a set of sentences, the learner will describe the given sentences that will make the idea relevant. (Describe Relevance/Irrelevance)

COMPREHENSION/Mood, Character Traits, Plot

Hierarchy



Behavioral Objectives

C/MCP-1. Given pictures expressing mood, the learner will identify the mood depicted. (Identify Mood)

C/MCP-2. Given sentences containing words which convey character mood, the learner will distinguish the words and expressions which convey mood. (Distinguish Mood)

C/MCP-3. Given a literary selection, the learner will describe the mood of the selection. (Describe Mood)

C/MCP-4. Given words or phrases depicting character traits or feelings and related pictures, the learner will identify traits or feelings by matching the words or phrases with the pictures. (Identify Character Traits/Feelings)

C/MCP-5. Given sentences containing words which convey character traits, the learner will distinguish the words and expressions which convey character traits. (Distinguish Character Traits)

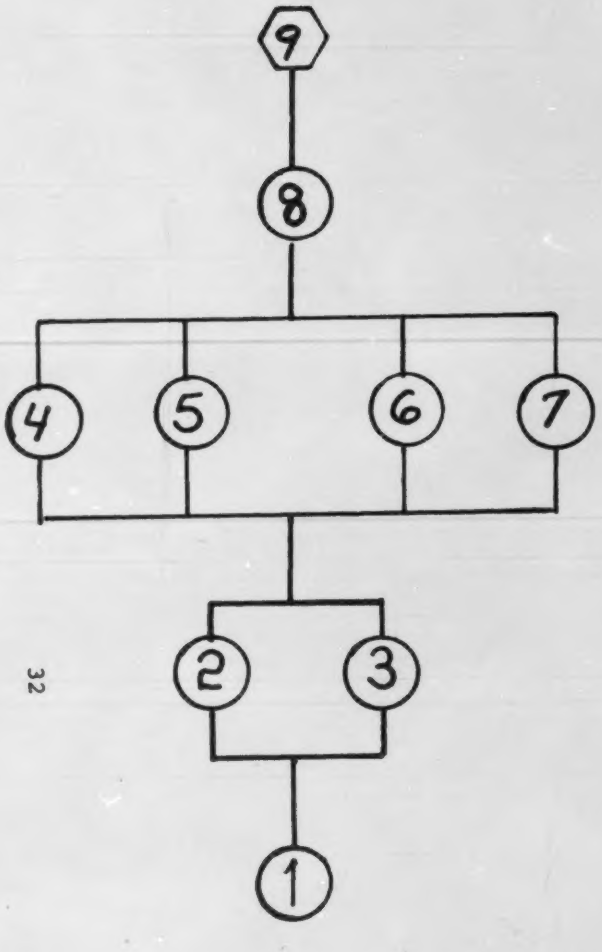
C/MCP-6. Given a story, the learner will describe character traits and feelings by answering questions orally. (Describe Character Traits)

C/MCP-7. Given a short story followed by statements concerning the plot, the learner will distinguish the one sentence which best states the plot. (Distinguish Plot)

C/MCP-8. Given a literary selection, the learner will describe the plot by noting significant details of plot development. (Describe Plot)

C/MCP 9 The learner will describe the mood, character traits and plot of a literary work. (Describe Mood/Character/Plot)

Hierarchy



Behavioral Objectives

C/FL-1. Given figurative expressions and three choices of meanings, the learner will distinguish the figurative language by selecting the meaning which best interprets the expression. (distinguish figurative language)

C/FL-2. Given sentences and three choices of similes for each, the learner will distinguish the simile which best conveys the meaning of each sentence. (distinguish similes)

C/FL-3. Given a selection containing figurative expressions, the learner will identify the expressions and another expression which conveys the same meaning. (identify figurative language)

C/FL-4. Given sentences containing words of personification, the learner will identify the personification by selecting the correct words. (identify personification)

C/FL-5. Given sentences containing metaphors and a list of meanings, the learner will distinguish the metaphors by matching each metaphor with its meaning. (distinguish metaphors)

C/FL-6. Given a poem containing alliteration, the learner will identify the words of alliteration. (identify alliteration)

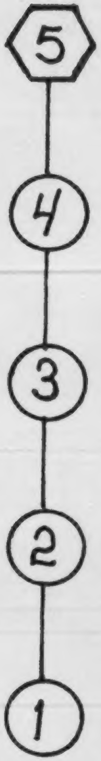
C/FL-7. Given figurative expressions, the learner will distinguish them as to metaphor, simile, and personification as well as alliteration. (distinguish figurative language)

C/FL-8. Given statements in which hyperboles are included, the learner will describe the hyperbole by reconstructing the the statement to convey the literal meaning. (describe the hyperbole)

C/FL-9. Given statements containing figurative expressions, the learner will describe each in a contextual situation. (describe figurative language)

COMPREHENSION/Sensory Imagery

Hierarchy | Behavioral Objectives



C/SI-1. Given objects or pictures that stimulate sensory imagery, the learner will identify the sense involved. (Identify Sensory Imagery)

C/SI-2. Given poems, the learner will identify sensory imagery by indicating the phrase or verse expressing sensory imagery. (Identify Sensory Imagery)

C/SI-3. Given words and/or phrases stimulating sensory imagery, the learner will distinguish the sense involved. (Distinguish Sensory Imagery)

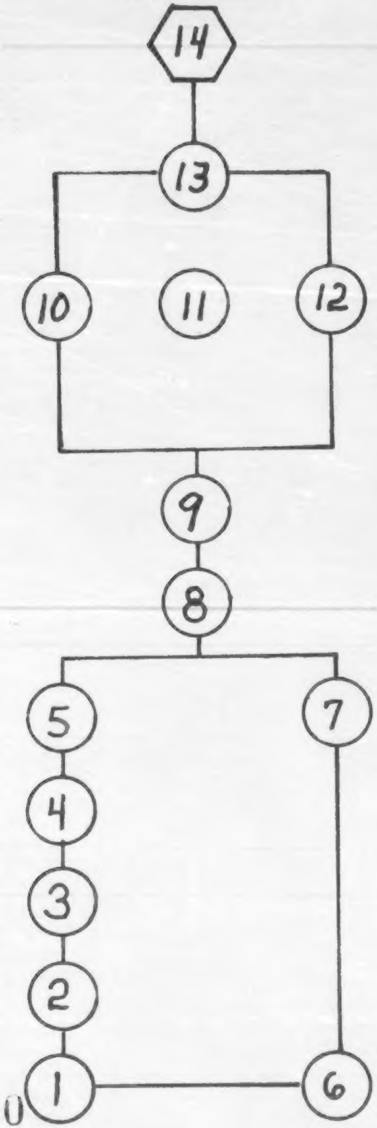
C/SI-4. Given paragraphs which express sensory imagery, the learner will describe similar examples from his own experience. (Describe Sensory Imagery)

C/SI⟨5⟩ Given titles, the learner will construct examples of sensory imagery. (Construct Sensory Imagery)

CRITICAL THINKING

COMPREHENSION/Critical Thinking

Hierarchy



Behavioral Objectives

C/CT-1. Given pictures, the learner will distinguish those that are real and those that are make-believe. (Distinguish Fact/Fantansy Pictures)

C/CT-2. Given an oral story, the learner will describe the true facts and the improbable events. (Describe Fact/Fantasy)

C/CT-3. Given a story and true and false statements about the story, the learner will distinguish those that are true and those that are false. (Distinguish Fact/Fantasy Stories)

C/CT-4. Given stories of fact and fantasy, the learner will order each story according to these categories. (Order Fact/Fantasy)

C/CT-5. Given titles containing factual or fanciful elements, the learner will distinguish titles that are fanciful. (Distinguish Fact/Fantasy)

C/CT-6. Given advertisements followed by a choice of propaganda techniques, the learner will identify the technique used for each advertisement and write a sentence supporting his selection. (Identify Propaganda Techniques)

C/CT-7. Given a newstopic, the learner will describe a version of the same topic using one propaganda technique. (Describe Propaganda)

C/CT-8. Given an editorial, the learner will distinguish the facts and the opinions. (Distinguish Facts/Opinions)

C/CT-9. Given pictures with sentences, the learner will distinguish the sentences which infer the meaning of the pictures. (Picture Inference)

COMPREHENSION/Critical Thinking

Hierarchy

Behavioral Objectives

C/CT-10. Given story titles, the learner will be able to describe the setting which is implied by each title.
(Describe Inference)

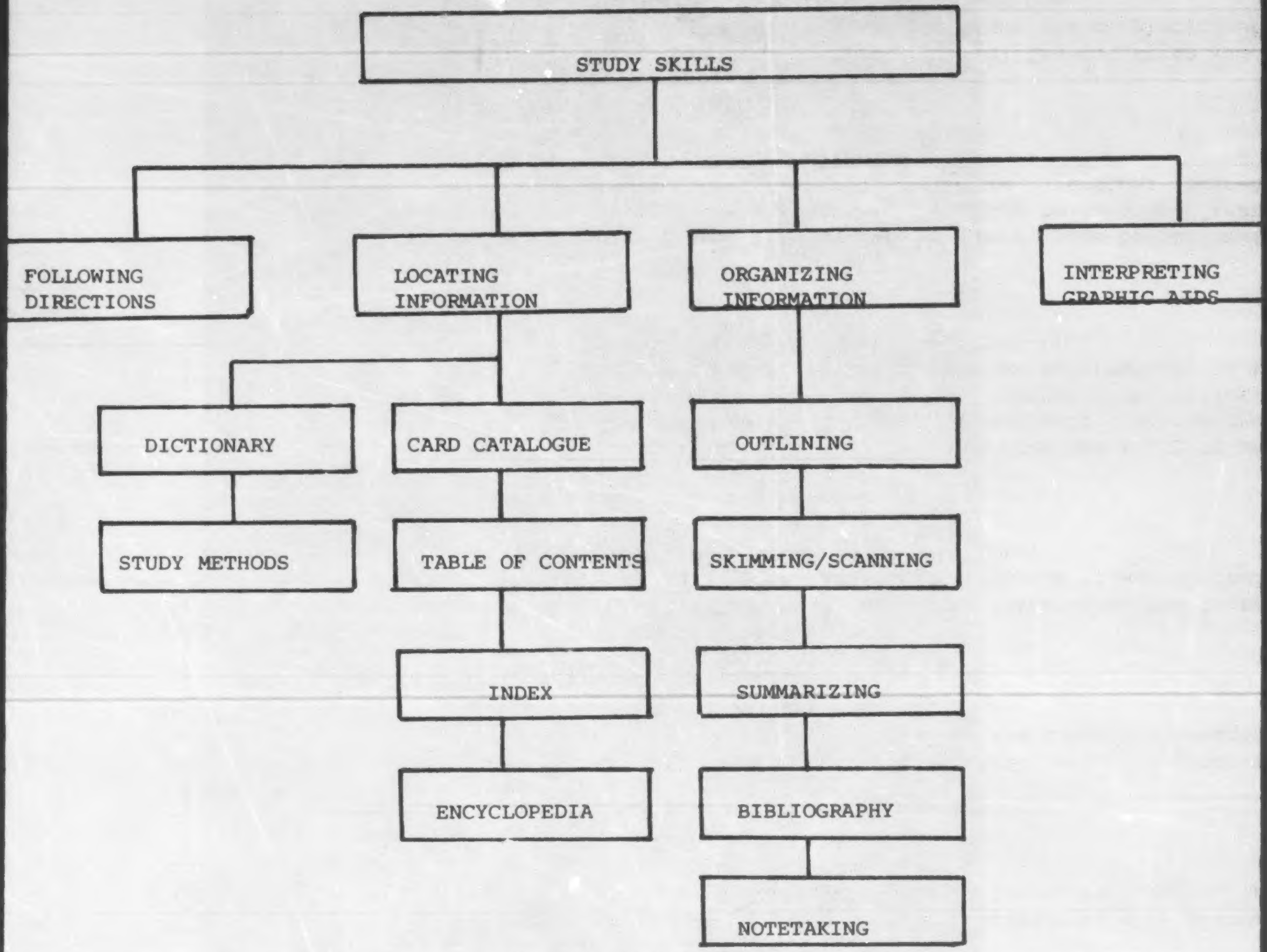
C/CT-11. Given a sentence and several statements which may be inferred, the learner will distinguish the inference by selecting the statement which best supports the meaning implied.
(Distinguish Inference)

C/CT-12. Given a story and statements denoting inference, the learner will distinguish the inferred statements related to the story.
(Story Inference)

C/CT-13. Given an argument or situation, the learner will evaluate and construct judgments about what he reads using internal and/or external standards (attitudes, values, facts, rules, principles).
(Construct Judgments)

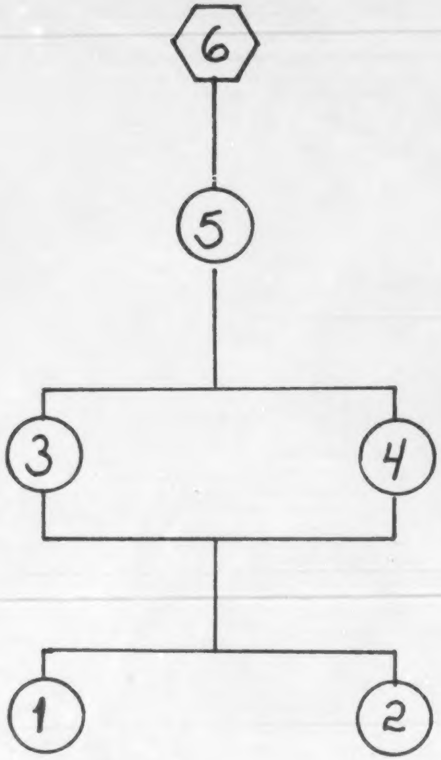
C/CT14 Given a situation, the learner will identify the criteria (validity, reliability) that is the most appropriate basis for making a judgment. (Describe Judgments)

STUDY SKILLS SCOPE AND SEQUENCE


STUDY SKILLS
FOLLOWING DIRECTIONS
LOCATING INFORMATION
ORGANIZING INFORMATION
INTERPRETING GRAPHIC AIDS
DICTIONARY
STUDY METHODS
CARD CATALOGUE
TABLE OF CONTENTS
INDEX
ENCYCLOPEDIA
OUTLINING
SKIMMING/SCANNING
SUMMARIZING
BIBLIOGRAPHY
NOTETAKING

STUDY SKILLS/Following Directions

Hierarchy

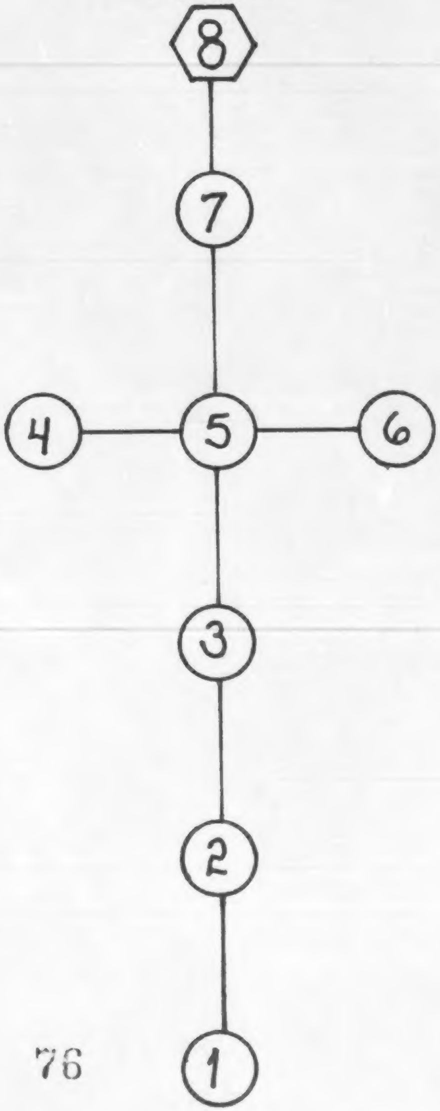


Behavioral Objectives

SS/FD-1.	Given oral/written one step directions, the learner will demonstrate the ability to perform the tasks required in the directions. (One Step Directions)
SS/FD-2.	Given oral/written two step directions, the learner will demonstrate the ability to perform the tasks required in the directions. (Two Step Directions)
SS/FD-3.	Given oral/written three step directions, the learner will demonstrate the ability to perform the tasks required in the directions. (Three Step Directions)
SS/FD-4.	Given a question of directions from one point to another in his familiar environment, the learner will describe the direction in movement from one point to another. The directions must specify cardinal directions such that movement may be taken independently. (Describe Cardinal Directions)
SS/FD-5.	Given a work study plan for the purpose of performing several daily tasks or duties, containing multi-step directions, the learner will read and follow the directions independently. (Follow Study Plan)
SS/FD⑥	Given written directions for filling out forms and/or making projects, the learner will construct the completion of the forms or projects by following the directions. (Follow Written Multi-Step Directions)

STUDY SKILLS/Dictionary

Hierarchy



Behavioral Objectives

SS/D-1. Given words, each beginning with a different letter, the learner will order the words alphabetically. (Order Words Alphabetically)

SS/D-2. Given a list of words, the learner will demonstrate the ability to estimate the location of these words by using an approximate division of the dictionary into thirds. (Estimate Location of Words)

SS/D-3. Given a list of words, the learner will identify the location of these words in the dictionary, alphabetizing to the fourth letter. (Alphabetizing to the Fourth Letter)

SS/D-4. Given a dictionary and a list of entry words, the learner will identify the guide words between which the entry words may be located. (Identify Guide Words)

SS/D-5. Given a dictionary or glossary, the learner will demonstrate the use of the pronunciation key to pronounce unfamiliar words. (Use of the Pronunciation Key)

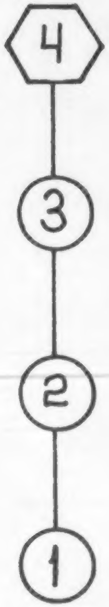
SS/D-6. Given a list of entry words used in context, the learner will distinguish the correct definition from multiple meanings of each entry word. (Distinguish Correct Definition)

SS/D-7. Given a dictionary, the learner will identify information pertaining to correct spelling, syllabication and accent, derivation, root word, or part of speech of any given word. (Interpret Information Given on Words)

SS/D⟨8⟩ Given words and directions related to dictionary information, the learner will demonstrate the correct use of the dictionary to locate the appropriate information. (Locate Appropriate Information)

STUDY SKILLS/Note Taking

Hierarchy



Behavioral Objectives

SS/NT-1. Given an oral selection or discussion, the learner will construct illustrated ideas to be used as notes when retelling story, reviewing steps in a process or giving a report. (Construct Illustrated Notes)

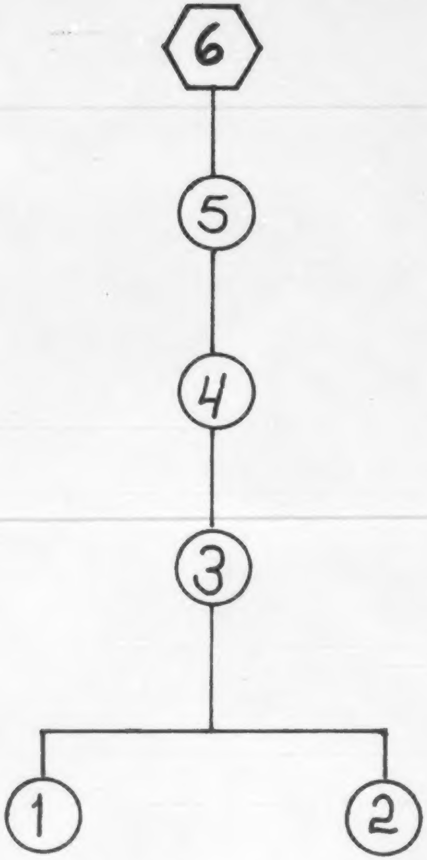
SS/NT-2. Given a selection containing words and ideas that show relationships, the learner will construct notes that show the name of the category, class or group to which the ideas belong. (Construct Notes)

SS/NT-3. Given a selection or an index related to a specific topic, the learner will construct notes of key words and phrases to record information. (Construct Notes from Key Words)

SS/NT 4. Given several sources to research for an independent project, the learner will demonstrate the ability to take notes in outline form, organize information and complete the project. (Note Taking in Outline Form)

STUDY SKILLS/Outlining

Hierarchy



Behavioral Objectives

SS/O-1. Given a short selection, the learner will identify the main idea. (Identify Main Idea)

SS/O-2. Given a group of subtopics or supporting details and main idea, the learner will identify the supporting details. (Identify Supporting Details)

SS/O-3. Given a short selection and a skeleton outline, the learner will construct a one-point outline using Roman Numerals: I, II, III, etc. (Construct One-Point Outline)

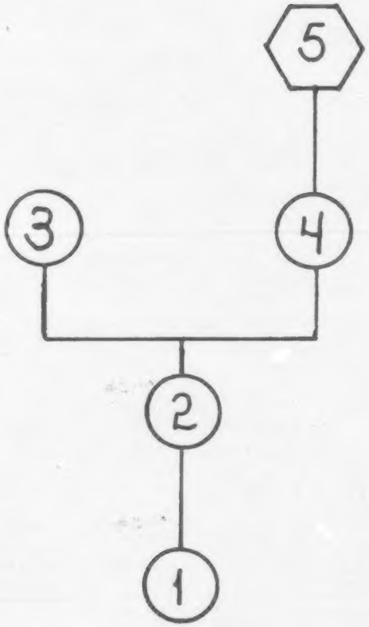
SS/O-4. Given material which can be organized in outline form and a skeleton outline, the learner will construct a two-point outline using Roman Numerals: I, II, III, etc.; and Capital Letters: A, B, C, etc. (Construct Two-Point Outline)

SS/O-5. Given a selection appropriate for outlining, the learner will construct a three-point outline using Roman Numerals: I, II, III; Capital Letters: A, B, C, etc.; and Arabic Numerals: 1, 2, 3. (Construct Three-Point Outline)

SS/O6 Given a selection, the learner will distinguish words, phrases and sentences to construct a three-point outline. (Distinguish/Construct Three-Point Outline)

STUDY SKILLS/Skimming

Hierarchy



Behavioral Objectives

SS/Sk-1. Given a short story, the learner will identify word clues and key words as aids to skimming. (Identify Key Words)

SS/Sk-2. Given statements, the learner will identify information to prove the statement. (Identify Proof of Information Accuracy)

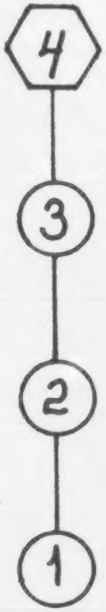
SS/Sk-3. Given a topic, the learner will distinguish details related to a topic. (Distinguish Details)

SS/Sk-4. Given paragraphs, the learner will demonstrate the ability to construct headings, and subheadings. (Construct Headings/Subheadings)

SS/Sk 5 Given any content area and a purpose for reading, the learner will demonstrate the ability to skim the material and answer the questions. (Demonstrate Skimming)

STUDY SKILLS/Summarizing

Hierarchy



Behavioral Objectives

SS/Su-1. Given a poem or story, the learner will be able to identify orally or written, key words or phrases which tell: What, where, when, who to summarize contents. (Identify Key Words)

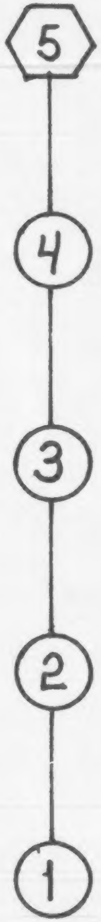
SS/Su-2. Given a story (News Topic) to read and a list of summary statements, the learner will be able to distinguish the appropriate summary statement of story or news topics. (Distinguish Summary Statements)

SS/Su-3. Given a story, the learner will describe a summary of the story in one or two statements. (Describe Summary)

SS/Su⟨4⟩ Given a story, news topic, novel, chapter in content field, the learner will demonstrate the ability to take notes, and from notes construct a summary of given material. (Construct Summary)

STUDY SKILLS/SQ_3R - PQRST Study Methods
(Survey, Question, Read, Recite, Review/Preview, Question, Read, Study, Test)

Hierarchy



Behavioral Objectives

SS/SM-1. Given a content reading selection, the learner will identify titles, subtopics, pictures, captions, introductory and summary paragraphs. (Survey/Preview)

SS/SM-2. Given bold faced headings or titles and subtopics, the learner will construct questions using such questioning words as who, what, when, where, why, describe, state, compare. (Question)

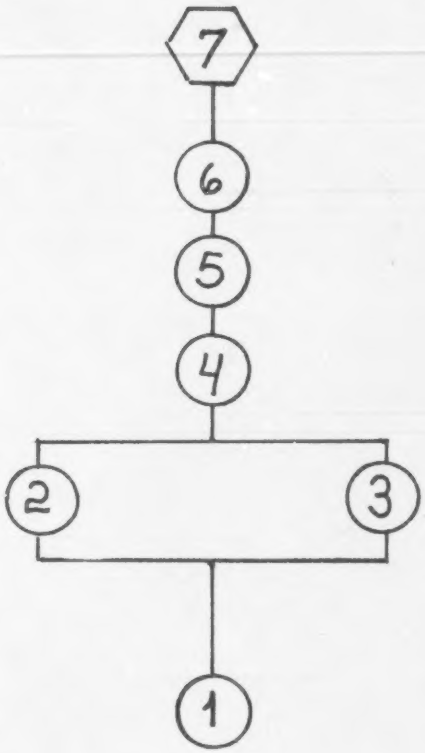
SS/SM-3. Given previously stated questions related to the topics of the content reading selection, the learner will identify answers by reading the selection. (Read)

SS/SM-4. Having read the content selection, the learner will describe answers to questions posed prior to the reading selection. (Recite)

SS/SM-5. Given questions whose answers appear hazy or incomplete, the student will reread to clarify the answers. (Review)

STUDY SKILLS/Graphic Aids

Hierarchy



Behavioral Objectives

SS/GA-1. Given the grouping of similar information, - ((e.g.) birthdays, pets, houses, apartment buildings) about a group (class, family, etc.), the learners will order the information based upon the characteristics.
(Order Information Characteristics)

SS/GA-2. Given information ordered for its characteristics in a graphic presentation (map graph, chart, table), the learner will distinguish the kinds of information presented.
(Distinguish Kinds of Information from Table, Chart, Graph)

SS/GA-3. Given a legend for a map, table, chart and/or graph, the learner will describe the keys and symbols and their relationships to the graphic aid(s). (Describe Legends)

SS/GA-4. The learner will describe primary and intermediate cardinal directions. (Describe Cardinal Directions)

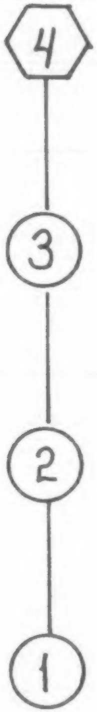
SS/GA-5. Given a map, globe, or atlas, the learner will distinguish the information contained in each.
(Distinguish Information from Map, Atlas)

SS/GA-6. Given a physical or political map, the learner will distinguish the physical information contained in each.
(Distinguish Physical/Political Map Information)

SS/GA7 Given a graphic aid which includes symbols, political, physical characteristics and legends, the learner will describe the information. (Describe the Information Presented in Graphic Aids)

STUDY SKILLS/Card Catalog

Hierarchy



Behavioral Objectives

SS/CC-1. Given a worksheet with words and phrases, the learner will order the words and phrases alphabetically with 100% accuracy. (Order Words/Phrases Alphabetically)

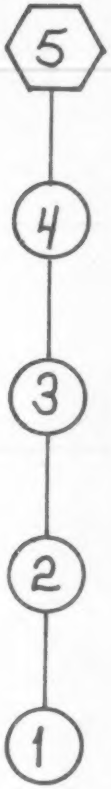
SS/CC-2. Given a handout with examples of the different kinds of cards in the card catalog, the learner will name each kind of card and identify the information found on each card. (Distinguish Card Catalog Types)

SS/CC-3. Given a list of titles of books, names of authors and subjects of books, the learner will identify each title, name of author and subject in the card catalog and state the call number for each book and find each book in the library. (Demonstrate the Use of the Card Catalog)

SS/CC 4. Given two topics and ten questions about each topic, the learner will identify and locate the appropriate material. (Identify and Locate Appropriate Material)

STUDY SKILLS/Table of Contents

Hierarchy



Behavioral Objectives

SS/TC-1. Given a table of contents in a book, the learner will identify the table of contents and types of information given. (Identify Table of Contents)

SS/TC-2. Given a table of contents and questions of reference, the learner will distinguish the stories and page numbers in which they are located as specified by the questions. (Identify Story Titles/Page Numbers)

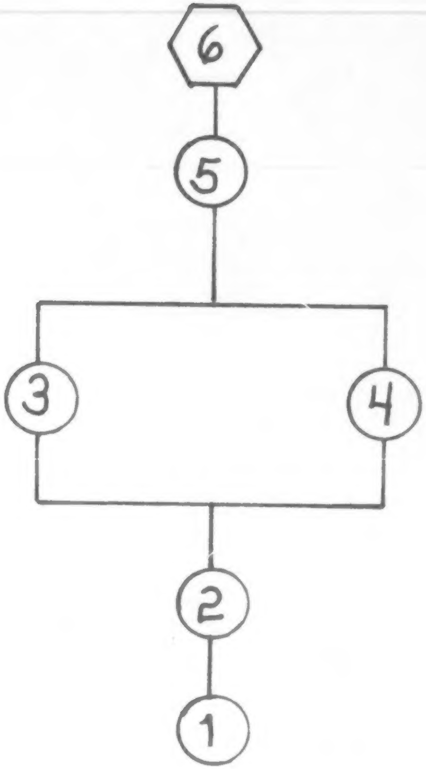
SS/TC-3. Given a table of contents of a text, the learner will distinguish the unit titles. (Distinguish Unit Titles)

SS/TC-4. Given a table of contents of a magazine, the learner will describe the types of information given by the table of contents. (Describe Table of Contents)

SS/TC-5. Given a reference topic, appropriate questions and resource materials, the learner will use the table of contents to distinguish the information relevant to the given topic. (Distinguish Resource Materials in Table of Contents)

STUDY SKILLS/Index

Hierarchy



Behavioral Objectives

SS/I-1. Given an index, the learner will identify the arrangement of information. (Identify Index Information)

SS/I-2. Given an index and the following rules, the learner will be able to describe the information contained in an index.

Rules:

(a) Topics are arranged alphabetically.
(b) Exact pages are given on which information may be found.
(c) The more important word in a phrase is placed first.
(d) The comma is used to separate topics from the page numbers.

(Describe Index Information)

SS/I-3. Given a sample index, the learner will distinguish between the main topics and subtopics to locate page numbers. (Distinguish Main Topics/Subtopics)

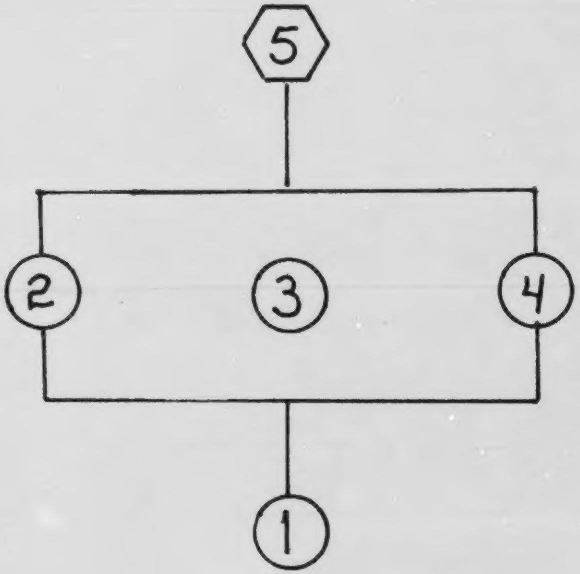
SS/I-4. Given an index, the learner will identify "See Also" or "See" as cross references to locate additional information. (Identify Cross References)

SS/I-5. Given random topics and subtopics with page numbers indicated, the learner will construct an index. (Construct an Index)

SS/I〈6〉 Given a list of topics to locate in the index, the learner will distinguish the location of the topics and cross references for each topic. (Distinguish Topics and Cross References)

STUDY SKILLS/Encyclopedia

Hierarchy



Behavioral Objectives

SS/E-1. Given a set of encyclopedias, the student will identify the location of the encyclopedia, volume letter, entry word, order of entries, guide words and supplementary volumes (index, yearbook and atlas). (Identify Entry, Guide Words)

SS/E-2. Given a list of topics, the student will identify volumes, pages, graphic aids and cross references for an entry in an encyclopedia article. (Identify Graphic Aids, Cross References)

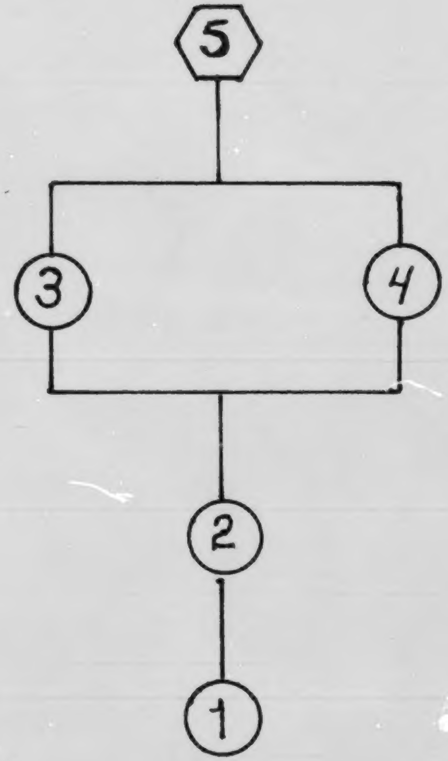
SS/E-3. Given a list of topics, questions and a set of encyclopedias, the student will identify subtopics for an article entry and construct one factual sentence to answer each question. (Identify Subtopics)

SS/E-4. Given index entries from two different sets of encyclopedias, the student will identify entries for topics and subtopics. (Identify Entries for Topics)

SS/E-5. Given a topic, five related questions and access to two sets of encyclopedias, the student will identify subtopics for questions, locate information in an encyclopedia and construct one factual sentence which answers each question. (Identify Subtopics)

STUDY SKILLS/Bibliography

Hierarchy



Behavioral Objectives

SS/B-1. Given a handout on "Preparing Bibliographies," the learner will identify the information contained on the handout. (Identify Information About Bibliographies)

SS/B-2. Given information on the "Kinds of Bibliographies," the learner will identify each kind. (Identify Bibliography Types)

SS/B-3. Given examples of bibliographic entries and blank index cards, the learner will identify the tools from which they were taken and construct a working bibliography for each entry. (Identify/Construct Bibliography)

SS/B-4. Given additional information on bibliographic entries, the learner will identify the purpose, form and location of footnotes. (Identify Footnotes)

SS/B 5 Using the correct bibliographic form, the learner will be able to construct a bibliography of 20 references on a given topic with 100% accuracy. The references will represent at least two sources from the card catalog, the Readers' Guide and an encyclopedia. (Construct Bibliography)

Dear Teacher,

Your reactions, comments and recommendations are vital to the collective ownership, effectiveness, usefulness and revision of this curriculum guide scope and sequence. Please write them and submit them to your building CBC Team leader who will forward them to the CBC Center. Your enthusiasm, dedication and prefessional competence can and will make the difference for our students.

The CBC Coordinating Team

PRELIMINARY DRAFT PRELIMINARY DRAFT

COMPETENCY BASED CURRICULUM

LANGUAGE ARTS/ENGLISH

SCOPE AND SEQUENCE

GRADES PRE-K THROUGH 9

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

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SUPERINTENDENT
1978

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CONTENTS

SECTION PAGE

Preface iii

I. ELEMENTARY SCOPE AND SEQUENCE

Listening 1

Speaking 2

Writing:

Grammar - Usage 4

Sentence Structure 7

Capitalization 9

Punctuation 11

Spelling 14

Creative Writing 16

Literature 17

Nonverbal Communication 19

Mass Media 20

Study Skills 21

II JUNIOR HIGH SCOPE AND SEQUENCE

Listening 22

Speaking 23

Writing:

Parts of Speech 24

Verb Usage 25

Subject - Verb Agreement 26

Pronoun Usage 27

Sentence Structure 28

Paragraphs 30

Themes and Compositions 31

SECTION PAGE

Capitalization.. 32

Punctuation... 33

Spelling.. 34

Creative Writing.. 35

Literature:

Poetry.. 37

Non-Fiction... 38

Short Story... 39

Drama... 41

Novel... 42

Myths, Legends, and Tales....................................... 43

Nonverbal Communication... 44

Mass Media.. 45

Study Skills.. 46

Test-Taking Skills.. 48

Thinking Skills... 49

104

PREFACE

The scope and sequence for the Language Arts/English Curriculum has identified the skills that students are expected to master by the end of the ninth grade. Proficiency in these skills is essential to the students' successful attainment of individual life goals and their effective participation in society.

Competencies that constitute language proficiency are as follows:

1. APPLY THE STANDARD RULES OF GRAMMAR IN SPEAKING AND WRITING.
2. APPLY THE SKILLS NECESSARY TO PRACTICAL EVERYDAY WRITING TASKS SUCH AS BUSINESS AND SOCIAL LETTER WRITING, FILLING OUT APPLICATIONS AND OTHER NECESSARY BLANKS AND FORMS.
3. SPEAK CLEARLY AND APPROPRIATELY TO COMMUNICATE IDEAS EFFECTIVELY.
4. ASK QUESTIONS TO ELICIT INFORMATION.
5. LISTEN ATTENTIVELY AND EFFECTIVELY TO ACQUIRE INFORMATION AND IDEAS.
6. IDENTIFY A VARIETY OF THEMES IN LITERATURE.
7. READ FOR PERSONAL PLEASURE AND FULFILLMENT.
8. LOCATE, ORGANIZE, AND USE INFORMATION FROM A VARIETY OF SOURCES.
9. APPLY STUDY SKILLS TO INCREASE KNOWLEDGE AND TO IMPROVE EFFICIENCY IN SCHOLASTIC AND VOCATIONAL PERFORMANCE.
10. DEMONSTRATE THE DEVELOPMENT OF A FUCTIONAL VOCABULARY ADEQUATE TO CONVEY IDEAS OF VARYING DEGREES OF COMPLEXITY.
11. IDENTIFY THE MAJOR FORMS OF MASS MEDIA AND DESCRIBE THEIR IMPACT ON THE INDIVIDUAL'S DAILY LIFE.
12. INTERPRET NONVERBAL FORMS OF COMMUNICATION.

The objectives presented here define the developmental sequence and the structure for each grade level, and provide the continuity for students' growth and development in the Language Arts/English Program. However, teachers should not assume that every student will progress at the same rate and in the same manner. While students tend to follow the same path in their language growth and go through the same sequential steps, they develop at individual rates. The teacher will need to select those skills best suited to the students at their level of development. Instruction should then be planned to insure mastery of the skills every student is expected to acquire.

Grade level designation for an objective is simply representative of the level at which a student is likely to be ready for instruction on that objective. Grades and levels have been indicated in order to accommodate the present various organization patterns of the schools.

The following definitions of symbols are given:

I=Introduce.	The skill is to be presented and taught to those students who have not already mastered the skill.
D=Develop.	Although the skill has been mastered by the student, it must be continually practiced, reviewed, and expanded over all grade levels.

INVITATION

The Language Arts/English Curriculum is continually being refined to meet the needs of the students. Each teacher is asked to examine the scope and sequence and contribute recommendations for modification and refinement.

ACKNOWLEDGEMENTS

The Competency Based Curriculum Scope and Sequence for Language Arts/English is being prepared by the following persons:

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COMPETENCY AREA: LISTENING

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Demonstrate the ability to follow directions.		I	D	D	D	D	D	D
2. Name descriptive sounds.		I	D	D	D	D	D	D
3. Identify rhyming elements.			I	D	D	D	D	D
4. Identify a complete thought.			I	D	D	D	D	D
5. Describe the sequence of ideas.			I	D	D	D	D	D
6. Identify the main idea.				I	D	D	D	D
7. Identify descriptive words and phrases.				I	D	D	D	D
8. Identify compound words.					I	D	D	D
9. Describe how pitch is used.						I	D	D
10. Describe inferred meanings as taken from context clues.							I	D
11. Identify the standards of a good listener.							I	D
12. Demonstrate the skill of attentive listening.								I
13. Demonstrate the skill of analytical listening.								I
14. Demonstrate the skill of appreciative listening.								I
15. Demonstrate the skill of marginal listening.								I
16. Distinguish among attentive, analytical, appreciative, and marginal listening.								I
17. Demonstrate good listening techniques.								I

COMPETENCY AREA: SPEAKING

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Demonstrate the ability to speak clearly and distinctly.		I	D	D	D	D	D	D
2. Demonstrate good dramatization techniques.		I	D	D	D	D	D	D
3. Describe objects according to shape and color.		I	D	D	D	D	D	D
4. Describe ideas relative to the subject.			I	D	D	D	D	D
5. Order ideas in sequence.			I	D	D	D	D	D
6. Describe familiar helpers in their environment.				I	D	D	D	D
7. Demonstrate the ability to make simple introductions and greetings.				I	D	D	D	D
8. Demonstrate the use of inflectional tone to convey an emotion.					I	D	D	D
9. Demonstrate the use of the telephone for business and social calls.					I	D	D	D
10. Construct a summary for a story.					I	D	D	D
11. Demonstrate the use of figurative language.						I	D	D
12. Identify the standards for good speaking.						I	D	D
13. Apply the rules for conducting interviews.							I	D
14. Demonstrate role playing techniques.							I	D

COMPETENCY AREA: SPEAKING

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
15. Apply the rules for conducting discussions.								I
16. Demonstrate good discussion techniques.								I
17. Apply the rules for making an oral report.								I
18. Demonstrate the ability to organize a two-minute talk using effective speaking techniques.								I

COMPETENCY AREA: WRITING

CATEGORY: GRAMMAR - USAGE

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Name nouns.			I	D	D	D	D	D
2. Identify nouns.			I	D	D	D	D	D
3. Identify singular and plural nouns.			I	D	D	D	D	D
4. Identify possessive nouns.			I	D	D	D	D	D
5. Name action words.			I	D	D	D	D	D
6. Identify verbs in context.			I	D	D	D	D	D
7. Identify a sentence as a complete thought.			I	D	D	D	D	D
8. Identify declarative sentences.			I	D	D	D	D	D
9. Identify interrogative sentences.			I	D	D	D	D	D
10. Identify pronouns.				I	D	D	D	D
11. Identify singular and plural pronouns.				I	D	D	D	D
12. Identify non-action verbs.				I	D	D	D	D
13. Identify regular verbs.				I	D	D	D	D
14. Identify irregular verbs.				I	D	D	D	D
15. Identify imperative sentences.				I	D	D	D	D
16. Identify exclamatory sentences.				I	D	D	D	D
17. Distinguish between common and proper nouns.					I	D	D	D
18. Identify possessive pronouns.					I	D	D	D
19. Distinguish between present and past tense.					I	D	D	D
20. Identify adjectives.					I	D	D	D

111

COMPETENCY AREA: WRITING

CATEGORY: GRAMMAR - USAGE

BEHAVIORAL OBJECTIVES	Entry PK	 K	Primary 1	 2	 3	Intermediate 4	 5	 6
21. Identify adjectives in context.					I	D	D	D
22. Distinguish among declarative, interrogative, imperative, and exclamatory sentences.					I	D	D	D
23. Identify simple subjects and predicates.					I	D	D	D
24. Identify complete subjects and predicates.					I	D	D	D
25. Identify linking verbs.						I	D	D
26. Distinguish among present, past, and future tense of verbs.						I	D	D
27. Identify descriptive adjectives.						I	D	D
28. Identify limiting adjectives.						I	D	D
29. Identify adverbs.						I	D	D
30. Identify adverbs in context.						I	D	D
31. Identify personal pronouns.						I	D	D
32. Identify indefinite pronouns.							I	D
33. Distinguish between demonstrative and interrogative pronouns.							I	D
34. Distinguish between descriptive and limiting adjectives.							I	D
35. Construct the appropriate forms of adjectives.							I	D
36. Distinguish among adverbs how, when, and where.							I	D
37. Contruct the appropriate forms of adverbs.							I	D
38. Identify prepositions.							I	D
39. Identify prepositions in context.							I	D
40. Identify prepositional phrases.							I	D

COMPETENCY AREA: WRITING

CATEGORY: GRAMMAR - USAGE

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
41. Identify conjunctions.							I	D
42. Identify conjunctions in context.							I	D
43. Distinguish between coordinate and correlative conjunctions.							I	D
44. Demonstrate the use of conjunctions as words that connect words, phrases, and sentences.							I	D
45. Identify interjections.							I	D
46. Identify compound subjects.							I	D
47. Identify compound predicates.							I	D
48. Construct compound sentences.							I	D
49. Construct sentence pattern noun and verb (NV).								I
50. Construct sentence pattern noun, verb, noun (NVN).								I
51. Construct sentence pattern noun, linking verb, noun (NLVN).								I
52. Construct sentence pattern noun, linking verb, adverb (NLVAdv.).								I
53. Construct sentence pattern noun, linking verb, adjective (NLVAdj.).								I
54. Apply the rule using the basic parts of speech as they relate to sentence sense, use, and structure.								I

COMPETENCY AREA: WRITING

CATEGORY: SENTENCE STRUCTURE

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Identify circles, triangles, and rectangles (shapes).	I	D	D	D	D	D	D	D
2. Construct straight lines as visually distinct patterns.		I	D	D	D	D	D	D
3. Construct a circle as a visually distinct pattern.		I	D	D	D	D	D	D
4. Identify capital and lowercase letters of the alphabet.		I	D	D	D	D	D	D
5. Construct manuscript letters.			I	D	D	D	D	D
6. Order letters to make a word.			I	D	D	D	D	D
7. Construct a picture/writing dictionary.			I	D	D	D	D	D
8. Order words to make sentences.			I	D	D	D	D	D
9. Demonstrate the ability to make the transition from manuscript to cursive writing.			I	D	D	D	D	D
10. Construct longer and varied sentences.				I	D	D	D	D
11. Identify the parts of a friendly letter.				I	D	D	D	D
12. Construct a friendly letter.				I	D	D	D	D
13. Construct cursive letters of the alphabet.					I	D	D	D
14. Identify and construct declarative, imperative, interrogative, and exclamatory sentences.					I	D	D	D
15. Order ideas and principles in logical form.					I	D	D	D
16. Identify the parts of a business letter.					I	D	D	D
17. Construct a business letter.					I	D	D	D

114

COMPETENCY AREA: WRITING

CATEGORY: SENTENCE STRUCTURE

	Entry		Primary			Intermediate		
BEHAVIORAL OBJECTIVES	PK	K	1	2	3	4	5	6
18. Apply the rule for addressing envelopes.					I	D	D	D
19. Construct business and social messages on post cards along with addresses.					I	D	D	D
20. Distinguish basic sentences from fragments and run-on sentences.						I	D	D
21. Apply the rules for proofreading.						I	D	D
22. Identify the parts of a book report.						I	D	D
23. Construct a book report.						I	D	D
24. Construct a letter of invitation.						I	D	D
25. Identify a topic sentence.							I	D
26. Describe the characteristics of a topic sentence.							I	D
27. Identify paragraph design and structure.							I	D
28. Construct a paragraph using topic sentences and supporting sentences.							I	D
29. Construct an outline.							I	D
30. Identify the parts of a newspaper.							I	D
31. Construct a one-page newspaper.							I	D
32. Apply the rules for completing information on a variety of forms.							I	D
33. Construct two unified paragraphs.								I
34. Describe the appropriate use of a friendly and business letter.								I
35 Apply the rules for constructing sentences and paragraphs.								I

115

COMPETENCY AREA: WRITING

CATEGORY: CAPITALIZATION

The student will be able to:

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
1. Identify the first word to be capitalized in a sentence.			I	D	D	D	D	D
2. Apply the rule for capitalizing the word I .			I	D	D	D	D	D
3. Apply the rule for capitalizing the first word of each line in some poetry.				I	D	D	D	D
4. Apply the rule for capitalizing proper nouns naming pets and persons.				I	D	D	D	D
5. Apply the rule for capitalizing proper nouns naming days, months, holidays and historical events.				I	D	D	D	D
6. Apply the rule for capitalizing proper nouns naming particular places.					I	D	D	D
7. Apply the rule for capitalizing each word in the greeting and the first word in each closing of a letter.					I	D	D	D
8. Apply the rule for capitalizing story titles.					I	D	D	D
9. Apply the rule for capitalizing proper nouns naming buildings and organizations.						I	D	D
10. Apply the rule for capitalizing initials.						I	D	D
11. Apply the rule for capitalizing abbreviations of proper nouns.						I	D	D
12. Apply the rule for capitalizing proper adjectives.							I	D

COMPETENCY AREA: WRITING

CATEGORY: CAPITALIZATION

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
13. Apply the rule for capitalizing words referring to the Diety and sacred writings.							I	D
14. Apply the rule for capitalizing the first word in a direct quotation.							I	D
15. Apply the basic rules of capitalization .								I

COMPETENCY AREA: WRITING

CATEGORY: PUNCTUATION

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Apply the rule for using periods to follow declarative sentences.			I	D	D	D	D	D
2. Apply the rule for using question marks with interrogative sentences.			I	D	D	D	D	D
3. Apply the rule for using an exclamation mark to follow exclamatory sentences.				I	D	D	D	D
4. Apply the rule for using a period to follow an imperative sentence.				I	D	D	D	D
5. Apply the rule for using a period to follow abbreviations.				I	D	D	D	D
6. Apply the rule for using a period to follow initials.				I	D	D	D	D
7. Apply the rule for using the apostrophe to show possession.				I	D	D	D	D
8. Apply the rule for using the apostrophe with contractions.				I	D	D	D	D
9. Apply the rule for using an exclamation mark to follow strong interjections.				I	D	D	D	D
10. Apply the rule for using commas in dates.				I	D	D	D	D
11. Demonstrate the use of a comma in the greeting and closing of a letter.					I	D	D	D
12. Apply the rule for placing commas in the address of a letter.					I	D	D	D

COMPETENCY AREA: WRITING

CATEGORY: PUNCTUATION

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
13. Apply the rule for using the comma to separate words in a series.					I	D	D	D
14. Apply the rule for separating the word too from the rest of a sentence.					I	D	D	D
15. Apply the rule for using the comma to separate a name in direct address.						I	D	D
16. Apply the rule for using a colon to introduce a list.						I	D	D
17. Apply the rule for using a colon after the greeting in a business letter.						I	D	D
18. Apply the rule for using quotation marks with direct quotations.						I	D	D
19. Apply the rule for using quotation marks around written conversation.						I	D	D
20. Apply the rule for underlining specific items.							I	D
21. Apply the rule for using commas with direct quotations.							I	D
22. Apply the rule for using a comma to follow mild interjections.							I	D
23. Apply the rule for using commas with coordinating conjunctions.							I	D
24. Apply the rule for using the hyphen to divide a word at the end of a line.								I
25. Construct and hyphenate compound words.								I

COMPETENCY AREA: WRITING

CATEGORY: PUNCTUATION

	Entry		Primary			Intermediate		
BEHAVIORAL OBJECTIVES	PK	K	1	2	3	4	5	6
26. Apply the rule for using commas to set off appositives.								I
27. Apply the rule for using commas for setting off parenthetical expressions.								I
28. Apply the rule for using quotation marks around specific titles.								I
29. Apply the rules of punctuation.								I

COMPETENCY AREA: WRITING

CATEGORY: SPELLING

The student will be able to:

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
1. Identify good spelling improvement techniques.					I	D	D	D
2. Construct plurals by adding s and es to words.					I	D	D	D
3. Construct plurals of nouns ending in y following a consonant.					I	D	D	D
4. Construct plurals of nouns ending in y following a vowel.					I	D	D	D
5. Construct the plural form of nouns which are formed in the same way and in an irregular way.					I	D	D	D
6. Apply the rule for dropping the final vowel when adding suffixes that begin with vowels (keeping long vowel sound).					I	D	D	D
7. Apply the rule for using an apostrophe to show possession (singular).					I	D	D	D
8. Apply the rule for using an apostrophe in contractions.					I	D	D	D
9. Apply the rule for doubling final consonants when adding suffixes that begin with vowels (keeping the short vowel sound).						I	D	D
10. Apply the rule for making words plural by changing f to v.						I	D	D
11. Apply the rule for making words plural when ending in o.							I	D
12. Apply the rule for keeping the final vowel when adding suffixes that begin with consonants.							I	D

121

COMPETENCY AREA: WRITING

CATEGORY: SPELLING

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
13. Apply the rule for using an apostrophe to show possession (plural).							I	D
14. Apply the rule for using words combining i and e.							I	D
15. Apply the rule for adding prefixes (un, dis, im, and mis).								I
16. Apply the rule for using proper nouns and adjectives formed from proper nouns.								I
17. Apply the rule for spelling words correctly.								I

COMPETENCY AREA: WRITING

CATEGORY: CREATIVE WRITING

	Entry		Primary			Intermediate		
BEHAVIORAL OBJECTIVES	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Demonstrate the use of multiple-meaning and descriptive words in a variety of situations.					I	D	D	D
2. Construct alliterative statements.					I	D	D	D
3. Construct onomatopoetic statements.					I	D	D	D
4. Construct literal and figurative statements.						I	D	D
5. Construct metaphoric statements.						I	D	D
6. Construct similes.						I	D	D
7. Construct an original haiku.							I	D
8. Construct an original cinquain.							I	D
9. Construct an autobiography.							I	D
10. Construct a biography.							I	D
11. Construct an alternative ending to a story.								I
12. Construct an original story.								I
13. Construct a written selection using examples of prose, poetry, figurative and literal language.								I

COMPETENCY AREA: LITERATURE

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Distinguish between real and make-believe.		I	D	D	D	D	D	D
2. Construct a fairy tale with picture clues.			I	D	D	D	D	D
3. Demonstrate rhythm in poetry.			I	D	D	D	D	D
4. Identify rhyme in poetry.			I	D	D	D	D	D
5. Identify the elements of a fairy tale.				I	D	D	D	D
6. Identify humor in a fanciful tale.				I	D	D	D	D
7. Identify imagery in poetry.				I	D	D	D	D
8. Describe sensory elements in poetry.					I	D	D	D
9. Identify the moral choice in a fable.					I	D	D	D
10. Identify onomatopoeia.					I	D	D	D
11. Describe plot/ethnic background in realistic/folk tales.						I	D	D
12. Identify biography.						I	D	D
13. Distinguish between biography and autobiography.						I	D	D
14. Identify similes and metaphors.						I	D	D
15. Identify personification.							I	D
16. Identify alliteration.							I	D
17. Describe rhythm in poetry.							I	D

COMPETENCY AREA: LITERATURE

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
18. Identify myth.							I	D
19. Identify legend.							I	D
20. Describe the plot in a ballad.								I
21. Identify exaggeration in a tall tale.								I
22. Distinguish between fiction and nonfiction.								I
23. Identify the point of view in an essay.								I
24. Distinguish among the elements of different types of literature.								I
25. Describe the author's principal ideas.								I

COMPETENCY AREA: NONVERBAL COMMUNICATION

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Demonstrate the use of body language as a means of nonverbal communication.		I	D	D	D	D	D	D
2. Identify meanings conveyed by facial expressions.			I	D	D	D	D	D
3. Identify messages conveyed by signs and symbols.				I	D	D	D	D
4. Identify messages conveyed by pictures.					I	D	D	D
5. Demonstrate the use of pantomine as a means of nonverbal communication.					I	D	D	D
6. Demonstrate the use of nonverbal modes of communication.					I	D	D	D

COMPETENCY AREA: MASS MEDIA

	Entry		Primary			Intermediate		
BEHAVIORAL OBJECTIVES	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Identify ten types of mass media.						I	D	D
2. Identify the audience to be attracted by mass media.							I	D
3. Distinguish between fact and opinion.							I	D
4. Distinguish among the four types of propaganda.							I	D
5. Identify an effective advertisement.							I	D
6. Describe the parts of a newspaper.								I
7. Describe the types of mass media.								I

COMPETENCY AREA: STUDY SKILLS

BEHAVIORAL OBJECTIVES	Entry		Primary			Intermediate		
	PK	K	1	2	3	4	5	6
The student will be able to:								
1. Identify the parts of the Five Step Study Method for Spelling.					I	D	D	D
2. Identify information on two types of graphs.					I	D	D	D
3. Construct a graph.					I	D	D	D
4. Identify the parts of a book.						I	D	D
5. Identify guide words.						I	D	D
6. Identify the correct pronunciation of words.							I	D
7. Identify the correct meaning of words.							I	D
8. Identify the location of materials in the sections of the library.								I
9. Demonstrate the use of the encyclopedia as a resource.								I
10. Apply the rules in constructing a brief report.								I
11. Distinguish among the resources for studying.								I

COMPETENCY AREA: LISTENING

BEHAVIORAL OBJECTIVES	ADVANCED I 7	 8	 9
The student will be able to:			
1. Construct at least five questions or comments that are pertinent to the listening situation or specific topic.	I	D	D
2. Demonstrate the ability to follow directions in a listening situation in which directions containing at least five steps are given.	I	D	D
3. Apply the rules for evaluating one's own listening skills.	I	D	D
4. Construct an evaluation of the techniques used by a speaker.		I	D
5. Order the main points given in a listening situation.		I	D
6. Construct an outline containing at least three main ideas on a topic given in a listening situation.		I	D
7. Construct notes based on information given in a listening situation.		I	D
8. Distinguish between statements of fact and opinion.		I	D
9. Demontrate the ability to make the appropriate response in a given listening situation.		I	D

COMPETENCY AREA: SPEAKING

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Apply the rules for speaking in person or group conversation.	I	D	D
2. Apply the rule for giving clear and concise directions and explanations.	I	D	D
3. Construct pertinent and valid questions.	I	D	D
4. Apply the rules for effective speaking techniques when reading prepared selected texts.	I	D	D
5. Construct an organized report to be presented orally within a five-minute period.		I	D
6. Demonstrate the techniques for conducting a simple interview.		I	D
7. Apply the rules for participating in a prescribed discussion.		I	D
8. Construct a speech of persuasion for oral presentation.		I	D
9. Construct an extemporaneous three-minute or five-minute speech for oral presentation.		I	D
10. Apply the rules for speaking clearly, effectively, and correctly in informal and formal situations.		I	D

COMPETENCY AREA: WRITING

CATEGORY: PARTS OF SPEECH

	ADVANCED I		
BEHAVIORAL OBJECTIVES	7	8	9
The student will be able to:			
1. Distinguish among nouns, verbs, adjectives, and adverbs based on inflectional and derivational forms.	I	D	D
2. Distinguish among nouns, verbs, adjectives, and adverbs based on structure words (determiners, auxiliary verbs, and intensifier adverbs).	I	D	D
3. Distinguish among nouns, verbs, adjectives, and adverbs by their position in a sentence.	I	D	D
4. Distinguish among the parts of speech according to their function and meaning in a sentence.	I	D	D
5. Distinguish among the parts of speech based upon grammatical characteristics (form, position, function, and meaning).	I	D	D
6. Distinguish among the subclasses of nouns (common, proper, abstract, concrete, collective, and compound).		I	D
7. Distinguish among the uses of prepositional phrases.		I	D
8. Distinguish between auxiliary verbs and linking or action verbs.		I	D
9. Distinguish between relative and interrogative pronouns.		I	D
10. Distinguish among the subclasses of pronouns.		I	D
11. Distinguish among the subclasses of conjunctions (coordinating, correlative, and subordinate).		I	D
12. Distinguish among the classes and subclasses of parts of speech.		I	D

COMPETENCY AREA: WRITING

CATEGORY: VERB USAGE

	ADVANCED I		
BEHAVIORAL OBJECTIVES	7	8	9
The student will be able to:			
1. Apply the rules governing verb tenses and the appropriate principal parts.	I	D	D
2. Order the persons and forms of irregular verbs.	I	D	D
3. Identify transitive and intransitive verbs.	I	D	D
4. Distinguish between the uses of sets of troublesome verbs.	I	D	D
5. Apply the rules for correct verb usage.	I	D	D

COMPETENCY AREA: WRITING

CATEGORY: SUBJECT-VERB AGREEMENT

BEHAVIORAL OBJECTIVES	ADVANCED I 7		9
The student will be able to:			
1. Describe subjects and predicates.	I	D	D
2. Apply the rule concerning a third-person singular subject with a present tense verb.	I	D	D
3. Apply the rule that compound subjects may take either a singular or a plural verb.	I	D	D
4. Identify collective nouns in context as being singular or plural.		I	D
5. Apply the rule for subjects plural in form but singular in meaning.		I	D
6. Identify the correct predicate to use with nouns which have the same singular form as the plural form.		I	D
7. Apply the rule for nouns that are always plural.		I	D
8. Identify the correct verb to use with the relative pronoun in the adjective clause.		I	D
9. Apply the rule for making indefinite pronouns as subjects agree with verbs.		I	D
10. Apply the rule for agreement of subject and complements of different number.			I
11. Apply the rule that subject-verb agreement is not affected by intervening phrases.			I
12. Construct sentences containing agreement between subject and predicate verb.			I

133

COMPETENCY AREA: WRITING

CATEGORY: PRONOUN USAGE

	ADVANCED I		
BEHAVIORAL OBJECTIVES	7	8	9
The student will be able to:			
1. Apply the rule governing the nominative case of pronouns.	I	D	D
2. Apply the rule for avoiding double subjects.	I	D	D
3. Apply the rule governing the objective case of pronouns.	I	D	D
4. Apply the rule governing possessive pronouns.	I	D	D
5. Apply the rule governing the nominative or objective cases in incomplete constructions.		I	D
6. Apply the rule of case to who, whom, and whose.		I	D
7. Apply the rule governing the pronoun and its antecedent.		I	D
8. Construct sentences for each pronoun rule.		I	D

COMPETENCY AREA: WRITING

CATEGORY: SENTENCE STRUCTURE

BEHAVIORAL OBJECTIVES	ADVANCED I 7	 8	 9
The student will be able to:			
1. Identify the SV and SVO sentence patterns.	I	D	D
2. Identify the SLVN and SLVA sentence patterns.	I	D	D
3. Identify the SVO and SVIOO sentence patterns.	I	D	D
4. Identify SVOOC when the object complement can be a noun or an adjective.	I	D	D
5. Distinguish among the seven basic sentence patterns: SV, SVO, SLVN, SLVAdj, SVIOO, SVOOC (noun and adjective).	I	D	D
6. Construct sentences using the SV, SVO, SVIOO patterns.	I	D	D
7. Construct sentences using the SLVN, and ALVAdj, patterns.	I	D	D
8. Construct sentences using the SVOOC (noun and adjective) patterns.	I	D	D
9. Identify the appositive phrase.		I	D
10. Identify the infinitive phrase.		I	D
11. Identify the gerund phrase.		I	D
12. Identify the participial phrase.		I	D
13. Distinguish between verbal and appositive phrases.		I	D
14. Construct sentences containing verbal and appositive phrases.		I	D

COMPETENCY AREA: WRITING

CATEGORY: SENTENCE STRUCTURE

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
15. Identify subordinate (dependent) clauses.		I	D
16. Distinguish complete sentences from fragments (phrases, dependent clauses) and run-ons.		I	D
17. Identify adjective and adverb clauses.		I	D
18. Identify and construct complex sentences.			I
19. Construct simple, compound, and complex sentences using various structures and patterns.			I

136

COMPETENCY AREA: WRITING

CATEGORY: PARAGRAPHS

BEHAVIORAL OBJECTIVES	ADVANCED I 7	 8	 9
The student will be able to:			
1. Demonstrate the ability to limit the main idea of the topic.	I	D	D
2. Construct a concise topic sentence.	I	D	D
3. Identify the types of paragraph development.	I	D	D
4. Construct supporting sentences to develop the main idea.	I	D	D
5. Construct a concluding sentence.	I	D	D
6. Construct a paragraph containing appropriate transitional phrases.	I	D	D
7. Construct a paragraph according to time order, position order, or order of importance.	I	D	D
8. Construct a descriptive paragraph that creates an impression.		I	D
9. Construct a paragraph of definition.		I	D
10. Construct paragraphs to answer a question.		I	D
11. Construct paragraphs which state and support opinions.		I	D
12. Construct unified, coherent paragraphs applying the elements of good paragraph development.		I	D

COMPETENCY AREA: WRITING

CATEGORY: THEMES AND COMPOSITIONS

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Construct a newspaper article.		I	D
2. Construct a summary (précis).		I	D
3. Construct a limited topic appropriate for a shorter theme.		I	D
4. Construct an outline appropriate for a three to five paragraph theme.		I	D
5. Construct a well-developed introductory paragraph.		I	D
6. Construct the body of a theme.		I	D
7. Construct a conclusion to the theme.		I	D
8. Construct a final draft of the theme.		I	D
9. Construct a three to five paragraph theme.		I	D
10. Construct a book and movie review.			I
11. Construct an essay.			I
12. Construct a three to five page handwritten report.			I

COMPETENCY AREA: WRITING

CATEGORY: CAPITALIZATION

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Apply the rules for writing out and capitalizing numbers which are the names of streets.	I	D	D
2. Apply the rules for capitalizing relative words used as titles.	I	D	D
3. Apply the rules for capitalizing compass point words used as sections of a city or country.	I	D	D
4. Apply the rules for capitalizing some school subjects.	I	D	D
5. Apply the rules for capitalizing some business products.	I	D	D
6. Apply the rules for using capital letters in a variety of written materials.	I	D	D

COMPETENCY AREA: WRITING

CATEGORY: PUNCTUATION

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Apply the rules for using the period, question mark, exclamation mark, comma, apostrophe, colon, quotation mark, hyphen, and underlining.	*R	D	D
2. Apply the rules for writing conversations.	*R	D	D
3. Identify the semicolon, bracket, parentheses, dash, caret, and single quotation marks.		I	D
4. State the rules for using the semicolon, bracket, parentheses, dash, caret, and single quotation marks.		I	D
5. Apply the rules for using the semicolon, bracket, parentheses, dash, caret, and single quotation marks.		I	D
6. State the rules for the less common uses of the period, question mark, comma, apostrophe, colon, and hyphen.		I	D
7. Apply the rules for the less common uses of the period, question mark, comma, apostrophe, colon, and hyphen.		I	D
8. Apply the rules for using punctuation marks in given phrases, sentences, and paragraphs.			I

*These objectives are included for the purpose of reviewing the punctuation skills covered at the elementary level.

COMPETENCY AREA: WRITING

CATEGORY: SPELLING

The student will be able to:

BEHAVIORAL OBJECTIVES	ADVANCED I 7	 8	 9
1. Apply the rule for using the silent e.	I	D	D
2. Apply the rule for doubling the final consonant.	I	D	D
3. Apply the rule for using the final y.	I	D	D
4. Apply the rule for spelling words containing ie - ei.	I	D	D
5. Apply the rule for using prefixes to the spelling of words.		I	D
6. Apply the rules for spelling the plural forms of nouns.		I	D
7. Identify the correct spelling of words often confused.		I	D
8. Identify the singular and plural forms of selected foreign words.		I	D
9. Construct the correct spelling of words from the junior high school demons list.			I
10. Construct the correct spelling of words from the junior high school spelling list.			I
11. Apply the rules for the correct spelling of a given list of words.			I

COMPETENCY AREA: WRITING

CATEGORY: CREATIVE WRITING

BEHAVIORAL OBJECTIVES:	ADVANCED I		
	7	8	9
The student will be able to:			
1. Construct a plan for writing a paper.	I	D	D
2. Identify figurative language.	I	D	D
3. Distinguish among the types of literary devices.	I	D	D
4. Construct sentences and paragraphs containing literary devices.	I	D	D
5. Construct an autobiography of at least four paragraphs.	I	D	D
6. Construct a three-page biography on a self-selected person.	I	D	D
7. Identify the author's purpose for writing.		I	D
8. Describe the characteristics of the techniques for constructing nonfictional prose.		I	D
9. Construct an undocumented magazine article.		I	D
10. Construct a four or five page handwritten report.		I	D
11. Describe the characteristics of superior narrative writing.			I
12. Sequence the events of a narrative.			I
13. Construct a good narrative beginning.			I
14. Construct an interesting narrative development.			I
15. Construct a satisfying solution and conclusion.			I
16. Construct an appropriate setting.			I
17. Construct a characterization.			I

COMPETENCY AREA: WRITING

CATEGORY: CREATIVE WRITING

BEHAVIORAL OBJECTIVES:	ADVANCED I		
	7	8	9
18. Construct dialogue.			
19. Construct a written plan for a narrative theme.			I
20. Construct a myth, legend, or tale.			I
21. Construct a short story.			I
22. Construct three two-page evaluations of written selections.			I

COMPETENCY AREA: LITERATURE

CATEGORY: POETRY

BEHAVIORAL OBJECTIVES:	ADVANCED I		
	7	8	9
The student will be able to:			
1. Identify the theme and the author's purpose.	I	D	D
2. Identify artistic uses of words or phrases and common rhyme patterns.	I	D	D
3. Describe the structure of at least one poem.	I	D	D
4. Distinguish between different types of poems.	I	D	D
5. Describe the theme and purpose of a poem.	I	D	D
6. Describe imagery and the rhetorical devices used by the poet.	I	D	D
7. Construct two different types of poems.	I	D	D

COMPETENCY AREA: LITERATURE

CATEGORY: NON-FICTION

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Identify the common characteristics of biographical and autobiographical writings.	I	D	D
2. Describe the qualities and aspects of human personality as revealed by the words and actions of the subject.	I	D	D
3. Describe the types of factors in the subject's lifetime which led to major achievements as revealed in a biographical or autobiographical selection.		I	D
4. Identify the manner in which the author develops his point of view in a magazine article.		I	D
5. Identify the style the author uses to present his ideas in a personal (familiar) essay.			I
6. Describe the issue in a serious essay and react to it by agreeing or disagreeing.			I
7. Identify the purpose (explanation, persuasion, criticism, or praise) of an editorial.			I
8. Distinguish among the different types of non-fictional materials.			I

COMPETENCY AREA: LITERATURE

CATEGORY: SHORT STORY

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Name the facts given in the history of the short story.		I	D
2. Describe the literary terms associated with the short story.		I	D
3. Distinguish the characteristics of a short story from those of a novel.		I	D
4. Identify the characteristics of a character that answer the questions who, what, and how.		I	D
5. Distinguish between the characteristics of a major character and a minor character.		I	D
6. Distinguish between the antagonist and protagonist.		I	D
7. Identify the techniques of short story characterization.		I	D
8. Identify time, place, mood, and atmosphere in a short story selection.		I	D
9. Order important events leading to the climax, the actual climax, and the events following the climax.		I	D
10. Identify four kinds of conflicts in a selected short story.		I	D
11. State the theme of two short stories.		I	D

COMPETENCY AREA: LITERATURE

Page ____

CATEGORY: SHORT STORY

	ADVANCED I		
BEHAVIORAL OBJECTIVES	7	8	9
12. Construct an original title for narrative paragraphs and name the reasons for the selection.		I	D
13. Identify aspects occurring in personal life that are similar to or different from aspects occurring in the lives of fictional characters.		I	D
14. Name the reasons for personal enjoyment of self-selected short stories.		I	D
15. Identify slang terms, figurative language, dialects, and idioms as devices used by an author to give style to his writing.		I	D
16. Identify sarcasm, satire, and paradox as devices used by the author to give style to his writing.		I	D
17. Name foreshadowing, flashback, and surprise endings as devices used by an author to give style to his writing.		I	D
18. Identify local, color, point of view, and prevailing conditions as devices used by an author to give style to his writing.		I	D
19. Identify the who, what and why where, and when as writing devices to give style to his writing.		I	D
20. Distinguish among the elements, characteristics, and techniques of a short story.		I	D

COMPETENCY AREA: LITERATURE

CATEGORY: DRAMA

	ADVANCED I		
BEHAVIORAL OBJECTIVES	7	8	9
The student will be able to:			
1. Identify the dramatic form of written materials.			I
2. Name the elements of a play (character, dialogue, setting, and plot).			I
3. Distinguish among prologue, acts, scenes, dislogue, stage directions, and epilogue.			I
4. Describe the two major categories of drama and at least three of the five subcategories.			I
5. Order the sequence of events.			I
6. Identify the plot, conflict, rising action, climax, falling action, and conclusion.			I
7. Identify at least three of the elements that comprise the setting (time, place, historical event, and environment).			I
8. Describe the main character in a drama.			I
9. Construct an evaluation of the content and structure of a play.			I

COMPETENCY AREA: LITERATURE

CATEGORY: NOVEL

	ADVANCED		I
BEHAVIORAL OBJECTIVES	7	8	9
The student will be able to:			
1. Construct a working definition of the term NOVEL.			I
2. Describe the elements which constitute the setting of a novel.			I
3. State the character traits of an individual as presented in an excerpt from a novel.			I
4. Identify the incidents which indicate rising action, the climax, falling action, and the resolution.			I
5. Describe the major conflict of the novel, the type of conflict, and the antagonist and protagonist involved in the conflict.			I
6. Describe the theme of the novel.			I
7. Identify the point of view and describe the effect(s) the author achieves by using this point of view.			I
8. Identify five elements of the writer's technique.			I
9. Describe the influences of the writer's background upon his work.			I
10. Construct a critical analysis of the novel.			I

COMPETENCY AREA: LITERATURE

CATEGORY: MYTHS, LEGENDS, AND TALES

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Distinguish among a fable, legend, myth, tall tale, and folk tale.		I	D
2. Describe the historical origins of myths, legends, and tales.		I	D
3. Describe the characteristics of various Greek and Roman divinities and their domains.		I	D
4. Identify and describe the symbols of gods and goddesses.		I	D
5. Name major mythological gods and goddesses.		I	D
6. Identify and describe mythological creatures.		I	D
7. Describe the origin of words derived from mythology.			I
8. Identify and describe the influences of fables, legends, myths, and tales on literature.			I
9. Construct a comparative analysis of a folk tale and fable, a Greek myth and tall tale, and various legends.			I

COMPETENCY AREA: NONVERBAL COMMUNICATION

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	3	9
The student will be able to:			
1. Distinguish between verbal and nonverbal communication.	I	D	D
2. Name nonverbal modes of communication.	I	D	D
3. Identify time and space as nonverbal means of body-language.	I	D	D
4. Identify messages conveyed by various modes of nonverbal communication.	I	D	D
5. Identify meanings conveyed by facial expressions and body language.	I	D	D
6. Construct a description of body language used to communicate given messages.	I	D	D
7. Construct a description of various nonverbal communication methods.	I	D	D
8. Construct original messages using various nonverbal communication modes.	I	D	D

COMPETENCY AREA: MASS MEDIA

BEHAVIORAL OBJECTIVES	ADVANCED		
	7	8	9
The student will be able to:			
1. Describe the development of media types.	I	D	D
2. Distinguish between printed media and electronic media.	I	D	D
3. Distinguish among the purposes and techniques of mass media.	I	D	D
4. Name functions of the newspaper.	I	D	D
5. Identify items according to section.	I	D	D
6. Describe four parts of a newspaper article.	I	D	D
7. Name and describe the techniques of the news advertisements.	I	D	D
8. Describe how ads influence the public.	I	D	D
9. Apply the rules for evaluating mass media.	I	D	D

COMPETENCY AREA: STUDY SKILLS

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Describe the characteristics of good study habits.	I	D	D
2. Name the physical and informational parts of a dictionary.	I	D	D
3. Identify entry words that are not located alphabetically between a given set of guide words.	I	D	D
4. Identify the various parts of dictionary entries.	I	D	D
5. Identify the appropriate dictionary meaning of an entry word that fits a given context.	I	D	D
6. Apply the rules for using the dictionary effectively.	I	D	D
7. Describe the functions of the various parts of a book.	I	D	D
8. Describe the characteristics of several study methods.	I	D	D
9. Construct footnotes and bibliographical entries.		I	D
10. Identify key words and phrases in sample American documents.		I	D
11. Apply the rules for taking notes on index cards.		I	D
12. Order notes according to a logical development.		I	D
13. Distinguish among common library resources.		I	D

COMPETENCY AREA: STUDY SKILLS

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
14. Describe the characteristics of three different kinds of library catalog cards.		I	D
15. Identify library resources that are appropriate for a given topic.		I	D
6. Identify materials that will provide information appropriate to a given topic.		I	D
17. Identify the terms, functions, and definitions of various forms.			D
18. Construct order blank entries.			D
19. Demonstrate the ability to complete various application forms.			D
20. Apply the rules for effective study by completing a specific assignment.			D

COMPETENCY AREA: TEST-TAKING SKILLS

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Demonstrate the ability to paraphrase and study notes.	I	D	D
2. Name the different kinds of tests and their purposes.	I	D	D
3. Identify pertinent information about tests.	I	D	D
4. Demonstrate the ability to follow pre-test and test time directions.	I	D	D
5. Demonstrate the ability to apply previous learning to test situation.	I	D	D
6. Demonstrate the ability to answer objective questions.	I	D	D
7. Demonstrate the ability to answer essay-type test questions.		I	D
8. Describe efficient test-taking procedures.		I	D
9. Demonstrate the ability to complete a test efficiently within one class period.		I	D

COMPETENCY AREA: THINKING SKILLS

BEHAVIORAL OBJECTIVES	ADVANCED I		
	7	8	9
The student will be able to:			
1. Construct a passage from memory.	I	D	D
2. Identify the correct answer by convergent thinking.	I	D	D
3. Identify the correct answer by interpreting a clue.	I	D	D
4. Demonstrate the ability to recall specific information.	I	D	D
5. State the rule of association for a set of items.	I	D	D
6. State a rule for examples of comparison.	I	D	D
7. Distinguish the differences for a word with multi-meanings.	I	D	D
8. Order words according to categories.	I	D	D
9. Construct a conclusion for a situation by making a generalization.	I	D	D
10. Describe a situation by the examination of the mental attributes.	I	D	D
11. Name an inference for a given situation.	I	D	D
12. Name the logical conclusion for a given situation.	I	D	D

COMPETENCY AREA: THINKING SKILLS

	ADVANCED I		
BEHAVIORAL OBJECTIVES	7	8	9
13. State a rule for sets of items by inductive thinking.	I	D	D
14. Identify the correct answer by deliberation.	I	D	D
15. Name the parts of an item by analysis.	I	D	D
16. Order terms according to classifications.	I	D	D
17. Construct an analogy.	I	D	D
18. Identify the correct answer by deductive thinking.	I	D	D
19. Construct a concept.	I	D	D
20. Construct a whole item by synthesizing its parts.	I	D	D
21. Construct alternatives by using divergent thinking.	I	D	D
22. Construct logical conclusions using creative thinking for incomplete situations.	I	D	D
23. Distinguish choices of action according to judicious selection.	I	D	D
24. Apply a self-taught rule to a new situation.	I	D	D
25. Construct a solution to a situation by problem solving.	I	D	D

PRELIMINARY DRAFT PRELIMINARY DRAFT

COMPETENCY BASED CURRICULUM
MATHEMATICS SCOPE AND SEQUENCE
GRADES PRE-K THROUGH SIX

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

DR. VINCENT E. REED
SUPERINTENDENT
1978

Dr. James T. Guines
Associate Superintendent
Office of Instruction

Mrs. Joan W. Brown
Special Assistant - CBC
Office of Instruction

TABLE OF CONTENTS

Objectives	Code	Page
Preface		
Curriculum Production Committee		
Sets and Numbers	S	1
Numeration Whole Numbers	NW	4
Numeration Roman Numerals	NR	10
Problem Solving	PS	12
Whole Numbers		
Addition	W-A	14
Subtraction	W-S	18
Multiplication	W-M	22
Division	W-D	27
Rational Number Concepts	RN	32
Numeration Decimals	ND	36
Rational Numbers		
Common Fractions	RC-A	
Addition	RC-A	39
Subtraction	RC-S	44
Multiplication	RC-M	48
Division	RC-D	50
Decimals		
Addition	RD-A	52
Subtraction	RD-S	54
Multiplication	RD-M	56
Division	RD-D	58
Geometry		
Readiness	GR	61
Primary	GP	63
Intermediate	GI	65
Measurement		
Readiness	MR	69
Metric Linear	MM-L	72
Metric Area	M-AM	75
Customary Area	MA-C	78
Metric Volume	M-VM	81
Customary Volume	M-VC	83

TABLE OF CONTENTS

Objectives

Measurement (continued)

Objectives	Code	Page
Metric Mass	M-MM	88
Customary Weight Dry	MW-CD	90
Calendar	M-CAL	93
Clock	MC	95
Money	MM	96
Temperature	MT	97
Graphing	GRP-GRI	100

PREFACE

The Elementary Mathematics Scope and Sequence defines objectives that are to serve as a focal point of competency-based instruction. These objectives contribute to the development of specified competencies.

Competencies that constitute mathematical literacy essential for effective life-role functioning and toward which the general mathematics program of the D. C. Public Schools is directed are:

READING, WRITING, AND USING NUMBERS CORRECTLY IN RECEIVING OR CONVEYING QUANTITATIVE INFORMATION.

PERFORMING COMPUTATIONS APPLICABLE IN CONSUMER SITUATIONS.

ANALYZING PROBLEMS AND APPLYING RULES OF LOGIC IN REACHING VALID CONCLUSIONS.

ESTIMATING MEASUREMENTS AND RESULTS OF COMPUTATIONS.

CHECKING RESULTS FOR REASONABLENESS.

MEASURING DISTANCE, WEIGHT, TIME, CAPACITY AND TEMPERATURE WITH APPROPRIATE INSTRUMENTS OR DEVICES.

IDENTIFYING GEOMETRIC FORMS FOUND IN THE ENVIRONMENT AND APPLYING RULES FOR FINDING THEIR PERIMETERS, AREAS, AND VOLUMES AS NECESSARY IN MEASUREMENT AND PROBLEM SOLVING.

INTERPRETING AND CONSTRUCTING SIMPLE TABLES, CHARTS, GRAPHS, AND SCALE DRAWINGS.

APPLYING ELEMENTARY CONCEPTS OR PROBABILITY IN DETERMINING THE LIKELIHOOD OF FUTURE EVENTS.

IDENTIFYING USES OF THE COMPUTER IN EDUCATION, FINANCIAL TRANSACTIONS, AND IN INFORMATION STORAGE AND RETRIEVAL.

Objectives listed in this document are organized into ten strands or unifying themes for Grades Pre-K through Six. Within each strand, the objectives are sequenced in a progressive order of difficulty.

The teacher will need to select from each strand those objectives that are appropriate for his/her students. This selection may be based upon diagnostic information from the Prescriptive Mathematics Test results or from informal instruments. Instruction should then be planned with attention to dependency relationships and with provision for integrating skills from the various strands.

It is recognized that the continuous progress framework planned for our schools allows students to proceed through the sequenced set of objectives in accordance with their needs, rates, and learning styles. Therefore, the grade placement for an objective is simply representative of the level at which a learner is likely to be ready for instruction on that objective. In the grade level designations, an "X" suggests the level of introduction of a skill and an "M" is used to suggest levels at which there should be repeated or additional experiences for the student.

The mathematics curriculum is continually being refined to serve the needs of our students. Each teacher is asked to contribute recommendations for modification or revision.

ACKNOWLEDGEMENTS

The Competency-Based Curriculum Scope and Sequence for Elementary Mathematics has been prepared by the following persons:

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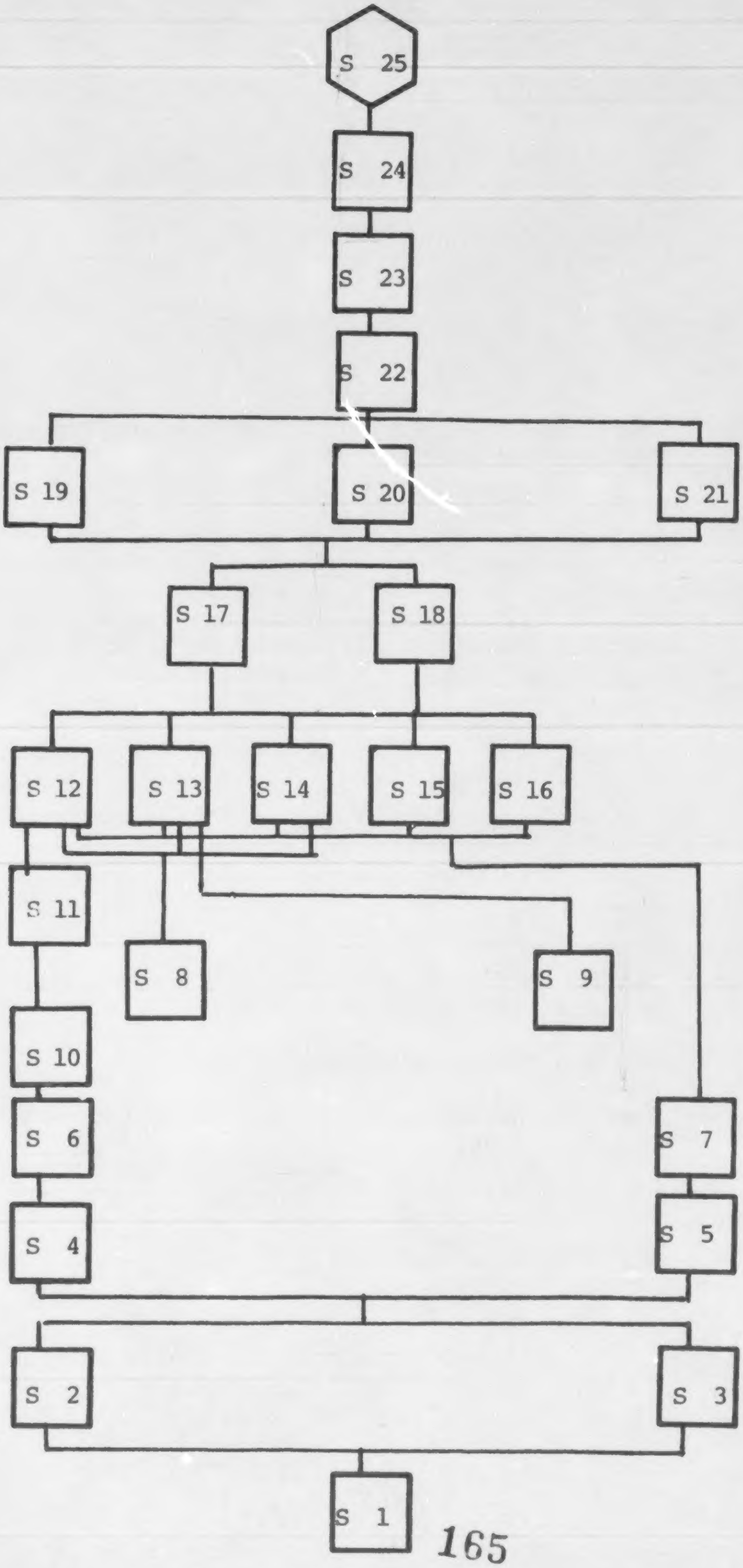
SETS AND NUMBERS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165

SETS AND NUMBERS

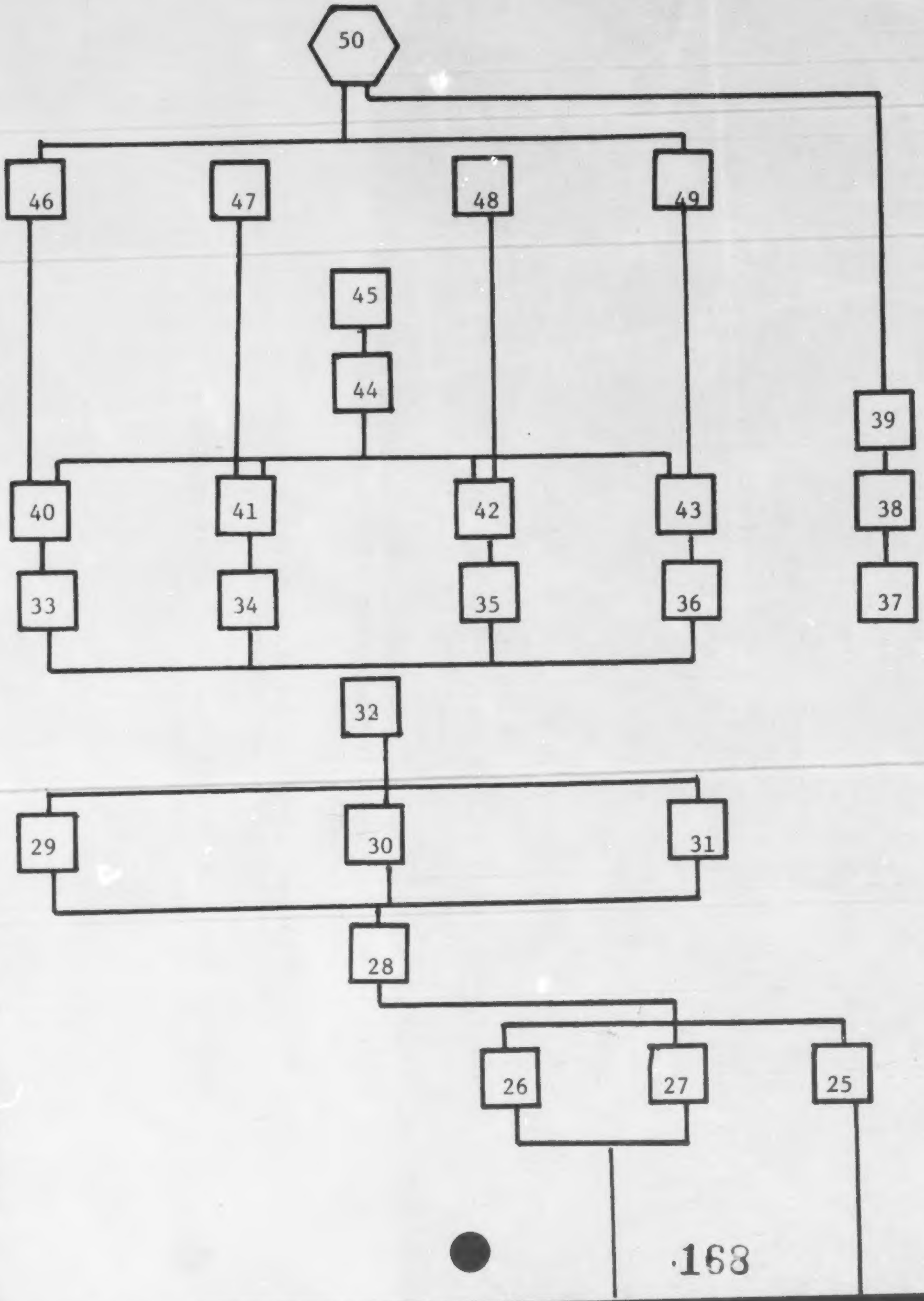
(S)

OBJECTIVES

The student will be able to:		Pre-K, K	1	2	3	4	5	6	
S-1.	Name the members of a given set. (Set not to exceed ten members)	X							
S-2.	Compare two sets to determine if they are equivalent sets. (Sets not to exceed ten members.)	X							
S-3.	Compare two non-equivalent sets to determine which has more or fewer members. (Sets not to exceed ten members.)	X							
S-4.	Join two disjoint sets to form a new set. (The new set should contain no more than 18 members. Readiness for basic addition facts)	X							
S-5.	Separate a set containing eighteen or fewer members into two subsets, and remove one of the subsets. (Readiness for basic subtraction facts)	X							
S-6.	Join two, three, four, or five equivalent sets to form a new set. (The new set should contain no more than 45 members. - Readiness for multiplication)		X	X					
S-7.	Separate a set containing forty-five or fewer members into equivalent subsets. (Readiness for division)		X						
S-8.	Identify the set of even numbers through one hundred.		X						
S-9.	Identify the set of odd numbers through ninety-nine.		X						
S-10.	Name the factors of any number which is the product of two one-digit numbers.					X	X		
S-11.	Name the greatest common factor of any two numbers less than 20.							X	X

		Pre-K, K	1	2	3	4	5	6
S-12.	Identify numbers divisible by 2. (Even numbers)						X	
S-13.	Identify numbers divisible by 5.						X	
S-14.	Identify numbers divisible by 10.						X	
S-15.	Identify numbers divisible by 3.						X	
S-16.	Identify numbers divisible by 9.						X	
S-17.	Name the set of prime numbers through 50.						X	
S-18.	Name the set of composite numbers through 50.						X	
S-19.	Name and identify the set of 2 digit multiples of 10.						X	
S-20.	Name and identify the set of 3-digit multiples of 100.						X	
S-21.	Name and identify the set of 4 digit multiples of 1000.						X	
S-22.	Name and identify the set of multiples of a given number. (Limit given number to one-digit numbers).						X	
S-23.	Name and identify the common multiples of two given numbers.						X	
S-24.	Name and identify the least common multiple (LCM) of two given numbers.						X	
S-25.	Name and identify the least common multiple of three given numbers.						X	

NUMERATION - WHOLE NUMBERS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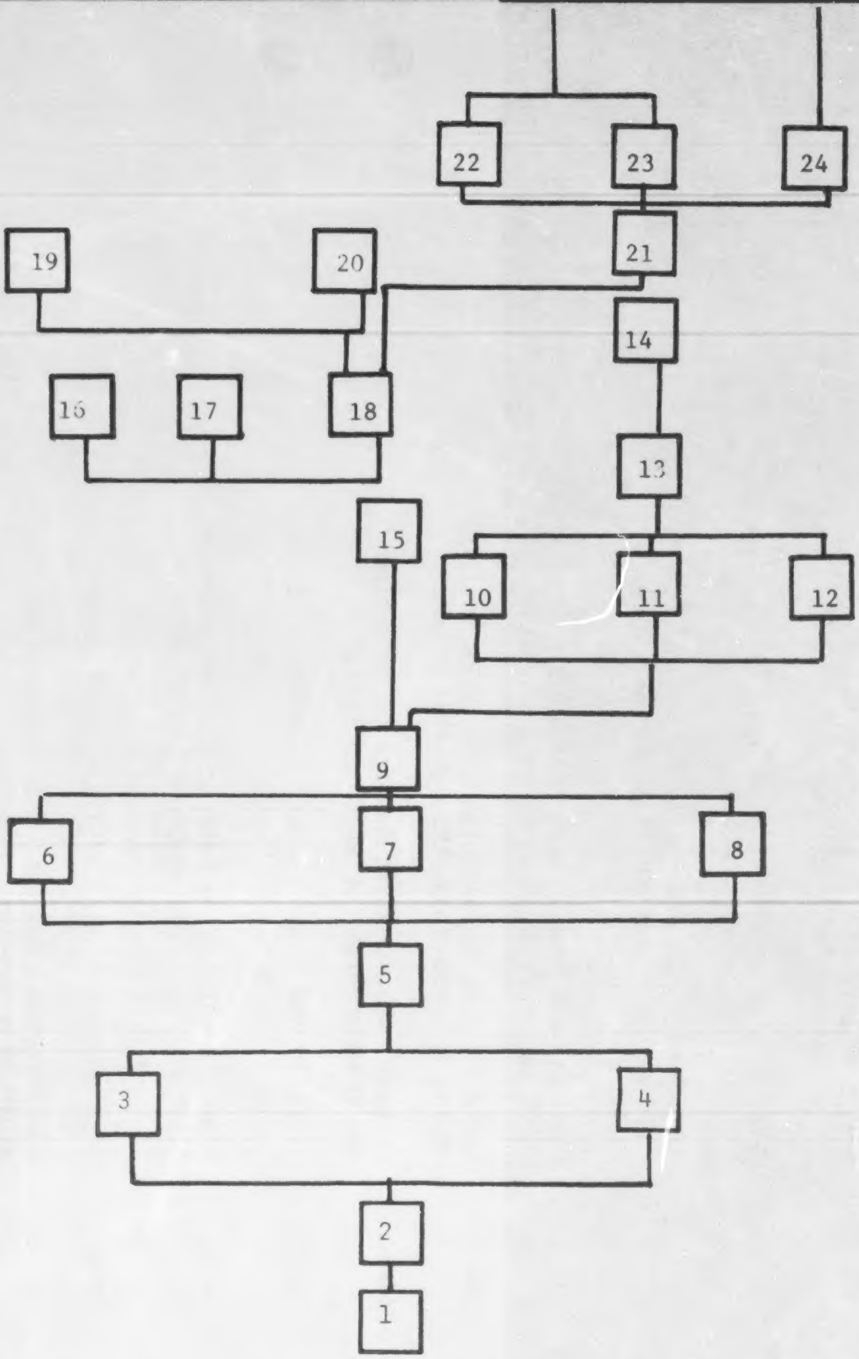


NUMERATION

WHOLE NUMBERS

(NW)

OBJECTIVES

The student will be able to:		Pre-K, K	1	2	3	4	5	6
NW-1.	Count by rote to establish the order of the counting numbers one through ten.	X						
NW-2.	Name the number property of a given set that does not exceed ten members.	X						
NW-3.	Identify, read, and write the numeral associated with a given set that does not exceed ten members.	X						
NW-4.	Identify and name "which one" in a given set. Limit set to ten members. (Ordinality)	X						
NW-5.	Count by rote to establish the order of the counting numbers one through thirty one.	X						
NW-6.	Compare two one-digit numbers to determine which is greater, or which is less.		X					
NW-7.	Identify and name the set of digits. (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)		X					
NW-8.	Name the missing numbers in a given sequence through ten. (The sequence has an interval of one.)		X					
NW-9.	Read and write any two-digit whole number.		X					
NW-10.	Identify and name the place value of each digit in a two-digit numeral.		X					
NW-11.	Identify and name the value of a specified digit in a two-digit number.		X					
NW-12.	Name any two-digit number using expanded notation.		X					
NW 13.	Write a two-digit number as a sum in which one addend is the lower decade multiple of ten. (73 = 60 + 13)			X				

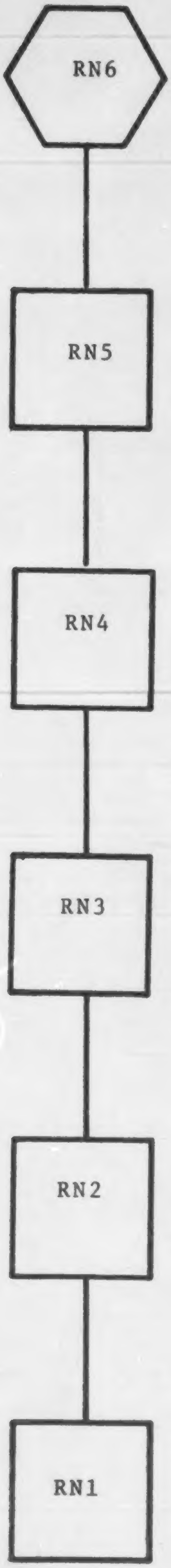
		Pre-K, K	1	2	3	4	5	6
NW-14.	Compare two two-digit numbers to determine which is greater, or which is less.			X				
NW-15.	Identify, read, and write number symbols for numbers one through one hundred.			X				
NW-16.	Name the number that comes before or after any number one through one hundred.			X				
NW-17.	Name and write the number that comes between two given numbers from zero through one hundred.			X				
NW-18.	Identify and name the missing number in a given sequence through one hundred, using an interval of two. (0, 2, 4, 6, n, ..., 100) (1, 3, 5, 7, n, . . ., 99)			X				
NW-19.	Identify and name the missing numbers in a given sequence through one hundred, using an interval of five. (Limit sequence to multiples of five.)			X				
NW-20.	Identify and name the missing numbers in a given sequence through one hundred, using an interval of ten. (Limit sequence to multiples of ten.)			X				
NW-21.	Identify, read, and write the symbols for whole numbers, one hundred through two hundred.			X				
NW-22.	Identify and name the place value of each digit in a three-digit numeral. (Whole numbers)			X				
NW-23	Read and write any three-digit whole number.			X				
NW-24.	Identify and name any three-digit number in expanded notation. 234 = 200 + 30 + 4				X			
NW-25.	Rename and write a three-digit number as: ones 429 = 429 ones tens and ones 429 = 42 tens and 9 ones hundreds, tens, and ones 429 = 4 hundreds, 2 tens, and 9 ones 429 = 3 hundreds,12 tens, and 9 ones.				X			

		Pre-K, K	1	2	3	4	5	6
NW-26.	Compare two three-digit whole numbers to determine which is greater or which is less.				X			
NW-27.	Round off a two digit number to the nearest ten; a three-digit number to the nearest hundred; to the nearest ten.				X			
NW-28.	Identify and name the place value of each digit in a four-digit numeral. (Whole numbers)				X			
NW-29.	Read and write any four-digit number.				X			
NW-30.	Compare two four-digit numbers to determine which is greater or which is less.				X			
NW-31.	Identify and name any four-digit whole number in expanded notation (e.g.) 2586 = 2000 + 500 + 80 + 6 2586 = (2 x 1000) + (5 x 100) + (8 x 10) + 6 x 1)					X		
NW-32.	Rename and write a four-digit number as: ones 1,429 = 1429 ones tens and ones 1,429 = 142 tens, 9 ones hundreds, ten, ones 1,429 = 14 hundreds, 2 tens, 9 ones 1,429 = 13 hundreds, 12 tens, 9 ones 1,429 = 13 hundreds, 11 tens, 19 ones thousands, hundreds, tens, ones 1,429 = 1 thousand, 4 hundreds, = 2 tens, 9 ones					X		
NW-33.	Identify and name the value of each place through the thousands period. (Whole numbers)					X		
NW-34.	Identify and name the place values in a five or six digit number.					X		
NW-35.	Read and write any whole number through the thousands period.					X		
NW-36.	Identify and name the value of any specified digit in a four-, five-, or six-digit numeral. (Whole numbers)					X		
NW-37.	Compare two five- or six-digit numbers to determine which is greater or which is less. (Whole numbers) (e.g. 65,241 and 65,421)					X		

172

		Pre-K, K	1	2	3	4	5	6
NW-38.	Round off a four digit number to the nearest: thousand (7,897 to 8,000) hundred (7,897 to 7,900) ten (7,897 to 7,900)					X		
NW-39.	Round off a five-or six-digit number to the nearest: thousand (53,476 to 53,000) ten thousand (153,476 to 150,000) hundred thousand (153,476 to 200,000)						X	
NW-40.	Name the value of each place through the millions period. (Whole numbers)						X	
NW-41.	Identify and name the place value in a seven, eight, or nine-digit number.						X	
NW-42.	Read and write any whole number through the millions period.						X	
NW-43.	Identify the value of any specified digit in a number through millions period. (Whole numbers)						X	
NW-44.	Identify and write any six digit whole number in expanded notation using product expressions. 123,456 = (1 x 1000,000) + (2 x 10,000) + (3 x 1000) + (4 x 100) + (5 x 10)+ (6 x 1)						X	
NW-45.	Identify and write any number six-digits or fewer in exponential notation. (Whole numbers) 623,457 = $(6 \times 10^5) + (2 \times 10^4) + (3 \times 10^3) + (4 \times 10^2) + (5 \times 10^1) + (7 \times 1)$							X X
NW.-46.	Name the value of each place in the billions period. (Whole numbers)							X
NW -47.	Identify and name the place value in a ten, eleven or twelve digit number.							X
NW-48.	Read and write any whole number through the billions period.							X
NW-49.	Identify and name the value of any specified digit in a number through the billions period. (Whole numbers)							X
NW-50.	Round off any seven, eight, or nine-digit number to the nearest millions place.							X

NUMERATION
ROMAN NUMERALS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RN1

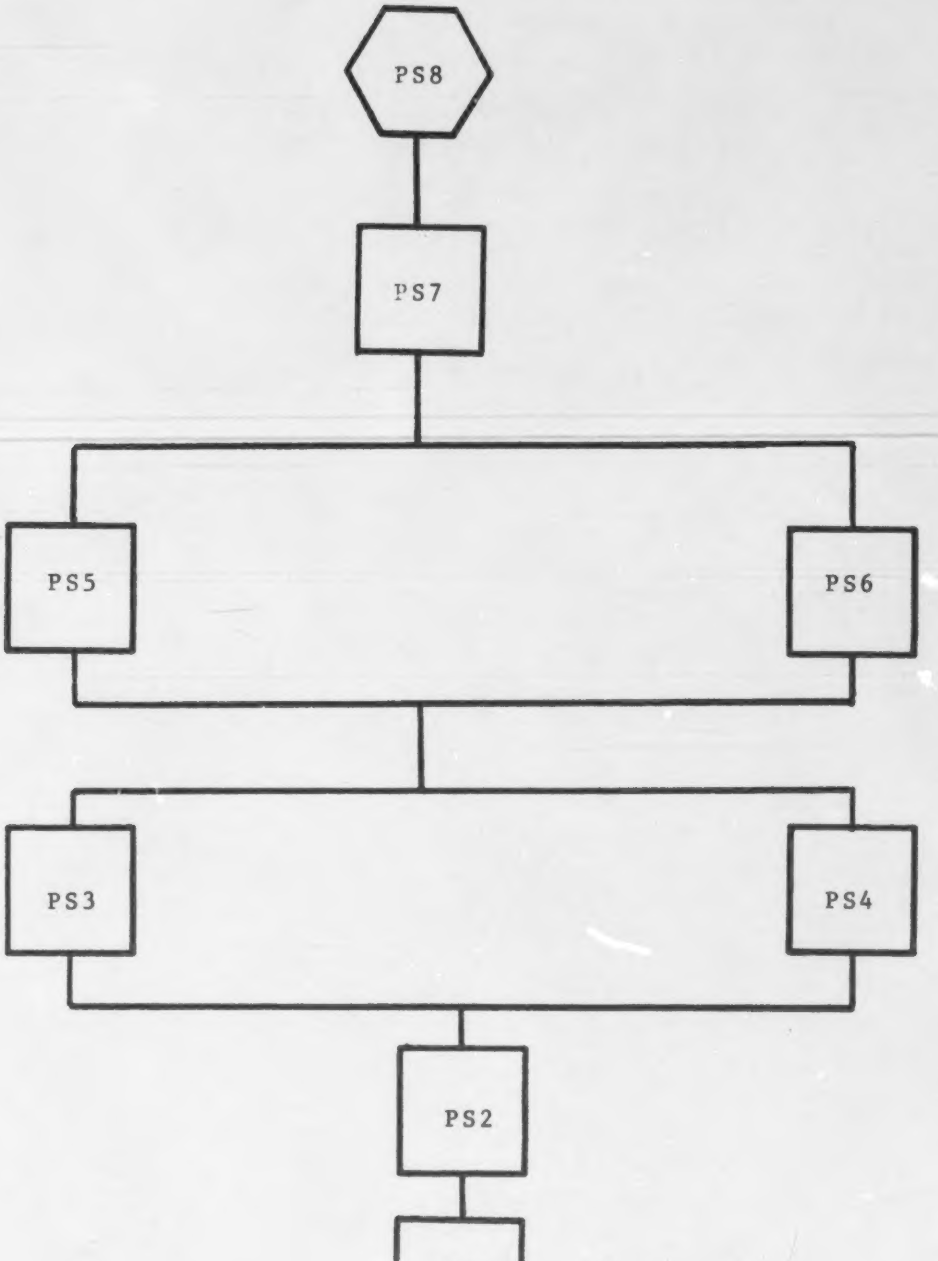
174

NUMERATION

ROMAN NUMERALS
(NR)

The student will be able to:		Pre-K, K	1	2	3	4	5	6
NR-1.	Name and write Roman Numerals for Arabic Numerals one, five and ten.				X			
NR-2.	Identify and write the Roman Numeral associated with a given Arabic Numeral less than forty.				X			
NR-3.	Name and write Roman Numerals associated with the Arabic Numerals fifty and one hundred.					X		
NR-4.	Identify and write the Roman Numeral associated with an Arabic Numeral less than four hundred.					X		
NR-5.	Name and write Roman Numerals for the Arabic Numerals five hundred and one thousand.						X	X
NR-6.	Identify and write any Roman Numeral associated with a given Arabic Numeral less than two thousand.						X	X

PROBLEM SOLVING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PS1

176

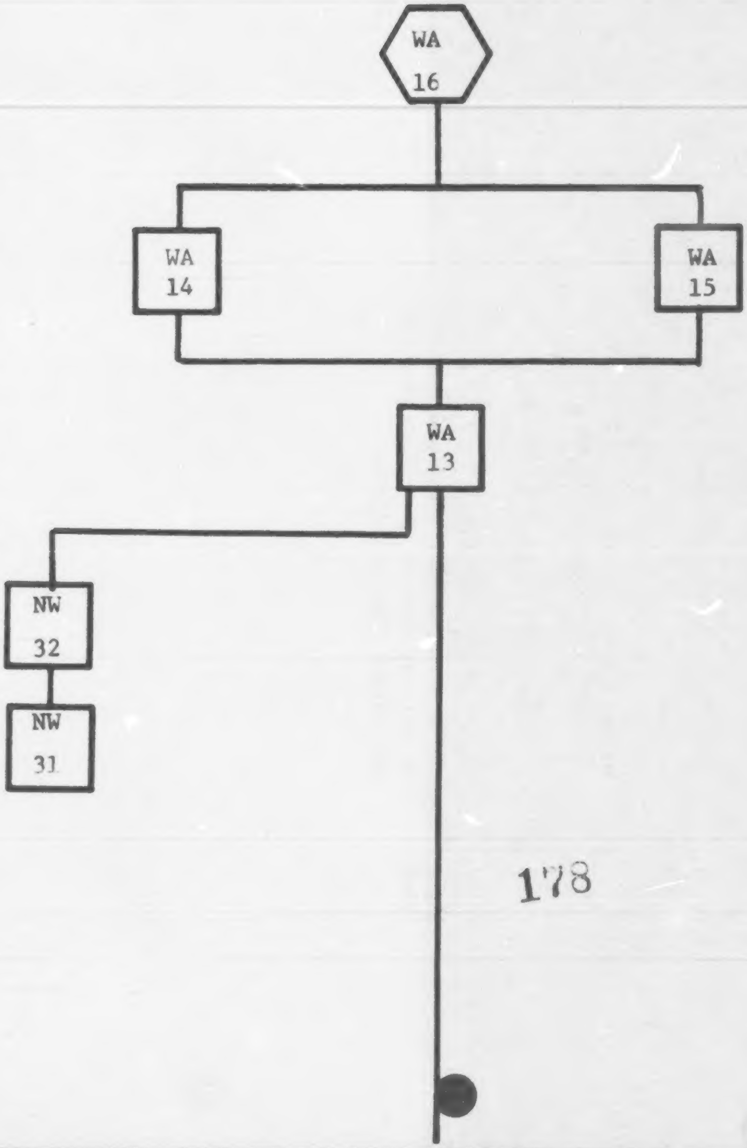
PROBLEM SOLVING

(PS)

Given a problem-solving situation the student will be able to:

		Pre-K, K	1	2	3	4	5	6
PS-1.	Identify pertinent information.		X	M	________________.			
PS-2.	Determine whether sufficient information is given.		X	M	________________.			
PS-3.	Interpret the given information.		X	M	________________.			
PS-4.	Illustrate the problem.		X	M	________________.			
PS-5.	Identify the operation(s) needed to solve the problem and write an appropriate open sentence.				X	M	________.	
PS-6.	Estimate a reasonable answer.				X	M	________.	
PS-7.	Solve the open sentence(s).				X	M	________.	
PS-8.	Solve any one or two-step problem and check the solution.				X	M	________.	

WHOLE NUMBERS
ADDITION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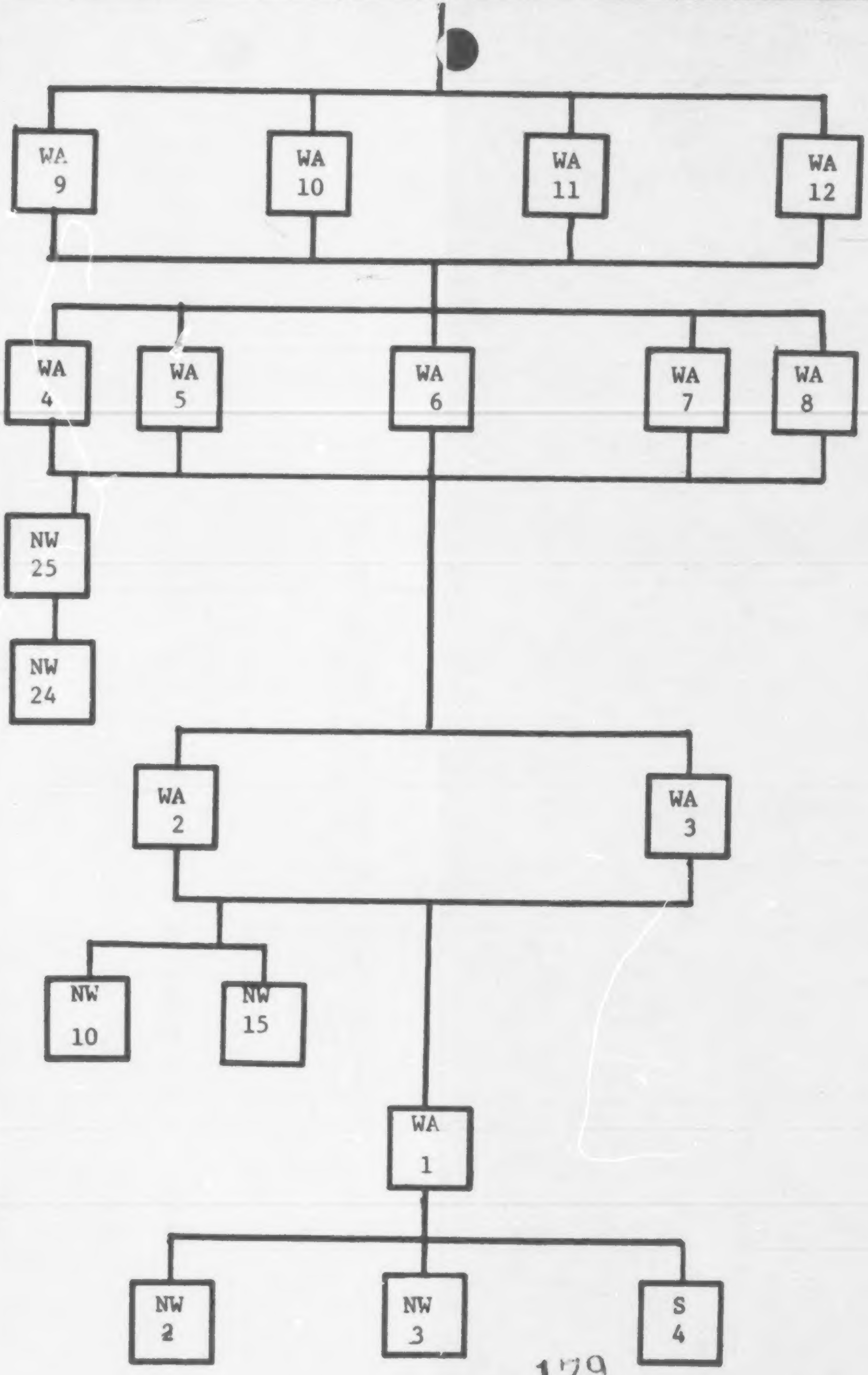
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WHOLE NUMBERS

Addition

(W-A)

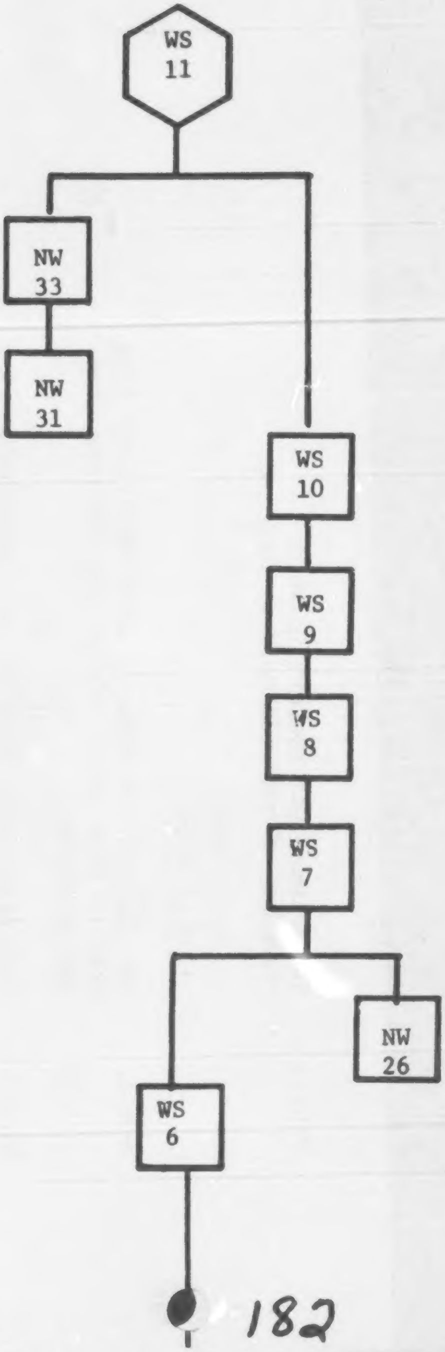
With successful performance in at least eight out of ten attempts, the student will be able to construct the sum of:

		Pre-K, K	1	2	3	4	5	6
* W-A1.	Two one-digit numbers. (Basic facts)		X					
W-A2.	A one-digit number and a two-digit number; two two-digit numbers with no regrouping; when sums are limited to less than one hundred.		X					
W-A3.	Three one-digit numbers with sums limited to eighteen. $\begin{array}{r}5\\1\\+1\\\hline\end{array}$ $\begin{array}{r}4\\2\\+3\\\hline\end{array}$ $\begin{array}{r}2\\2\\+2\\\hline\end{array}$ $\begin{array}{r}2\\7\\+9\\\hline\end{array}$		X					
W-A4.	Two two-digit numbers, with regrouping and sums limited to less than one hundred. $\begin{array}{r}46\\+27\\\hline\end{array}$			X				
W-A5.	Any three one-digit numbers. $\begin{array}{r}9\\8\\+2\\\hline\end{array}$ $\begin{array}{r}6\\8\\+9\\\hline\end{array}$			X				
W-A6.	A one-digit number and a two digit number with regrouping. $\begin{array}{r}35\\+9\\\hline\end{array}$ $\begin{array}{r}27\\+25\\\hline\end{array}$			X				
W-A7.	Four or more one-digit numbers. $\begin{array}{r}3\\8\\9\\+6\\\hline\end{array}$ $4 + 5 + 3 + 7 = 19$			X				

* Performance criterion for W-A1 is 100% mastery.

		Pre-K, K	1	2	3	4	5	6
W-A8.	Two two-digit numbers, with no regrouping in the ones place. 82 +95			X				
W-A9.	Any two two-digit numbers. 86 +75			X				
W-A10.	A one, two, or three-digit number to a three-digit number,with no regrouping. 246 572 237 +3 +16 +462			X				
W-A11.	Two three-digit numbers in which renaming of hundreds only is required. 843 800 +324 +300							
W-A12.	Two three digit numbers, with regrouping from ones to tens place. Limit sums to less than one thousand. 268 +718				X			
W-A13.	Two three-digit numbers, with regrouping from tens to hundreds, only and with limited sums to less than one thousand.				X			
W-A14.	Two three-digit numbers, with regrouping. 547 +876				X			
W-A15.	Four or more two-digit numbers. (Column addition) 23 42 81 +65				X			
W-A16.	Any set of four or more numbers. 3468 326 8468 246 38 7923 142 72 472 +32 +8 +75					X	M ___.	

WHOLE NUMBERS
SUBTRACTION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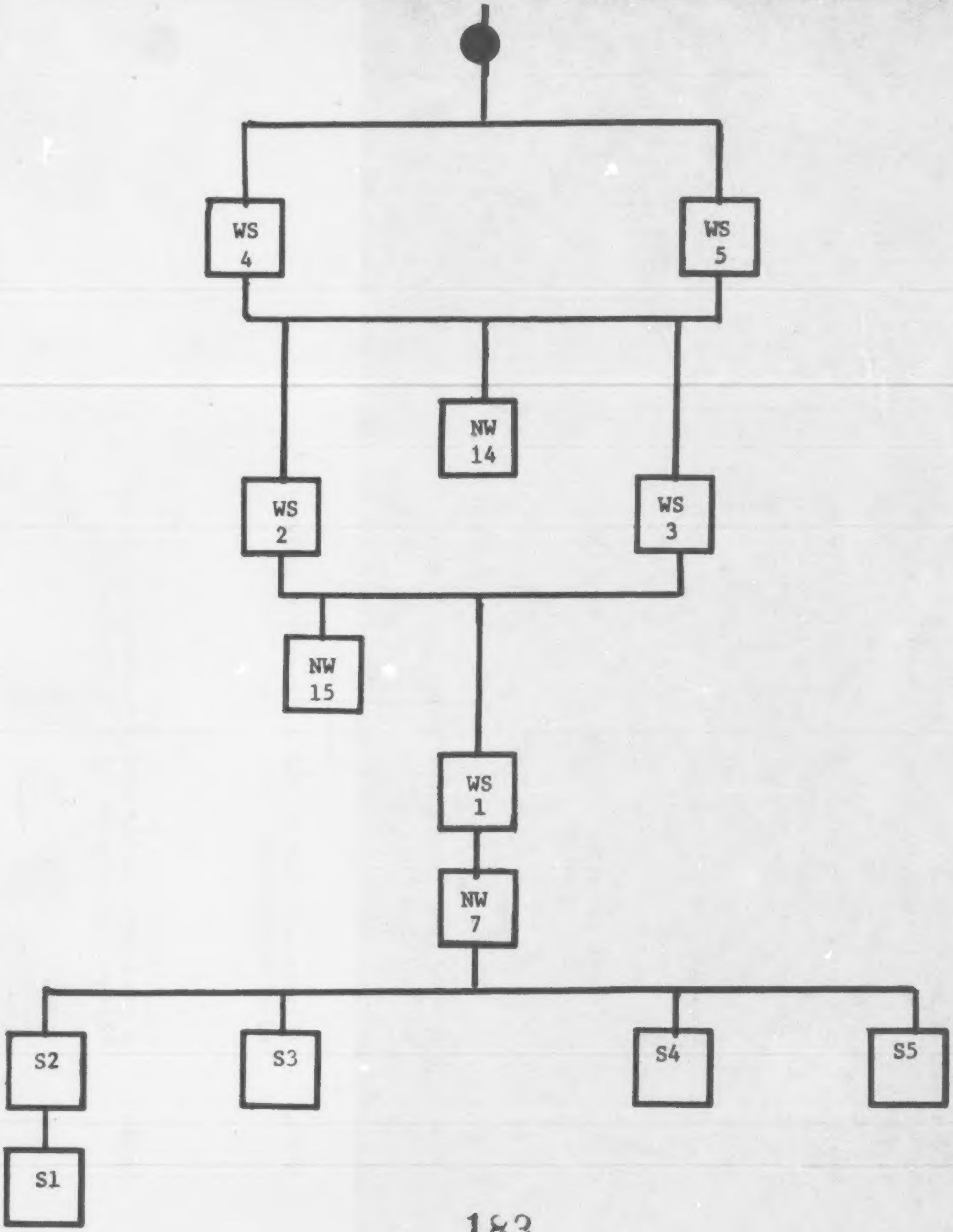
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WHOLE NUMBERS

Subtraction

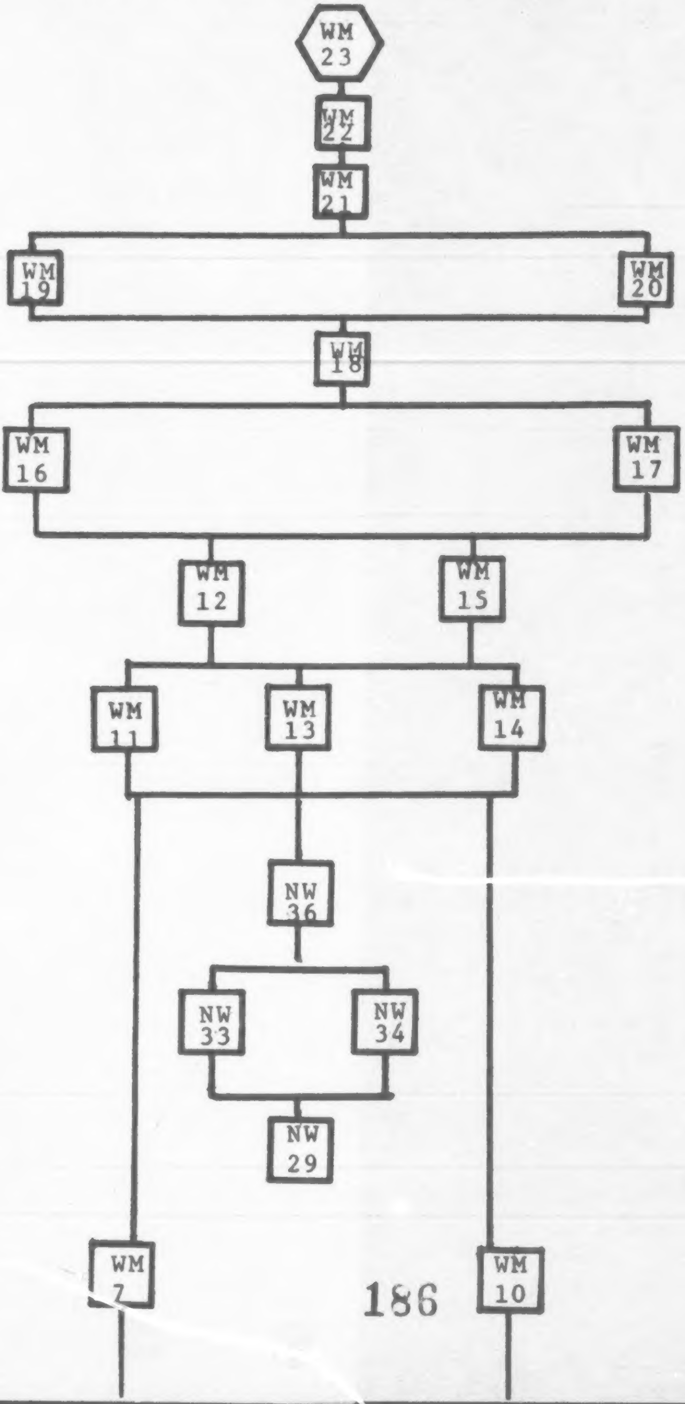
(W-S)

	With successful performance in at least eight out of ten attempts the student will be able to find the difference of:	Pre-K, K	1	2	3	4	5	6
*W-S1.	A one-digit number and a one-digit number or a two-digit number. (Sums 18 or less.) (Related to the basic addition facts.)		X					
W-S2	A one-digit number and a two-digit number, with no regrouping. $\begin{array}{r}49\\-6\\\hline\end{array}$		X					
W-S3.	A two-digit number and a two-digit number with no regrouping. $\begin{array}{r}46\\-13\\\hline\end{array}$		X					
W-S4.	A one-digit number and two-digit number with regrouping. $\begin{array}{r}46\\-8\\\hline\end{array}$			X				
W-S5.	A two-digit number and a two-digit number, with regrouping. $\begin{array}{r}46\\-19\\\hline\end{array}$			X				
W-S6.	A one, two, or three-digit number and a three-digit number, with no regrouping. $\begin{array}{rrrr}346 & 428 & 986 & 600\\-6 & -17 & -132 & -200\\\hline\end{array}$			X				
W-S7.	A one-digit number and a three-digit number, with regrouping. $\begin{array}{rrr}363 & 310 & 300\\-9 & -6 & -8\\\hline\end{array}$			X				
W-S8.	A two-digit number and a three-digit number, with regrouping in the tens place only. $\begin{array}{r}345\\-73\\\hline\end{array}$				X			

*Performance criterion: 100% accuracy

		Pre-K, K	1	2	3	4	5	6
W-S9.	A two-digit number and a three-digit number with regrouping. 346 346 346 -29 -72 -89				X			
W-S10.	A three-digit number and a three-digit number, with regrouping. 678 605 600 - 249 -143 -259				X			
W-S11.	A one-, two-, three-, or four-digit number and a four-digit number, with regrouping. 4230 4207 4027 4007 - 9 - 39 -139 -3269					X	M___.	

WHOLE NUMBERS MULTIPLICATION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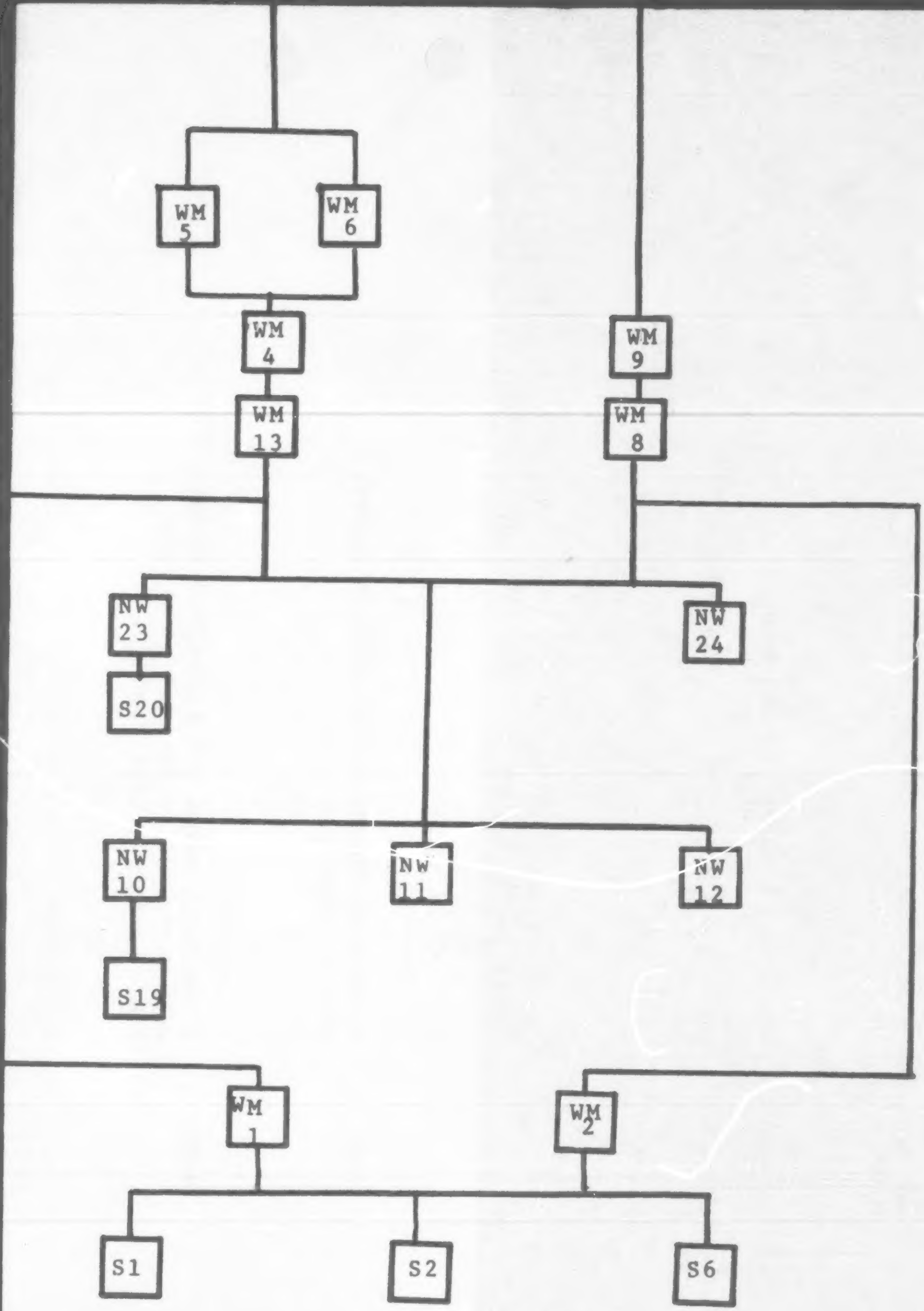
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WHOLE NUMBERS

MULTIPLICATION

(W-M)

With successful performance in at least eight out of ten attempts the student will be able to construct the product of:

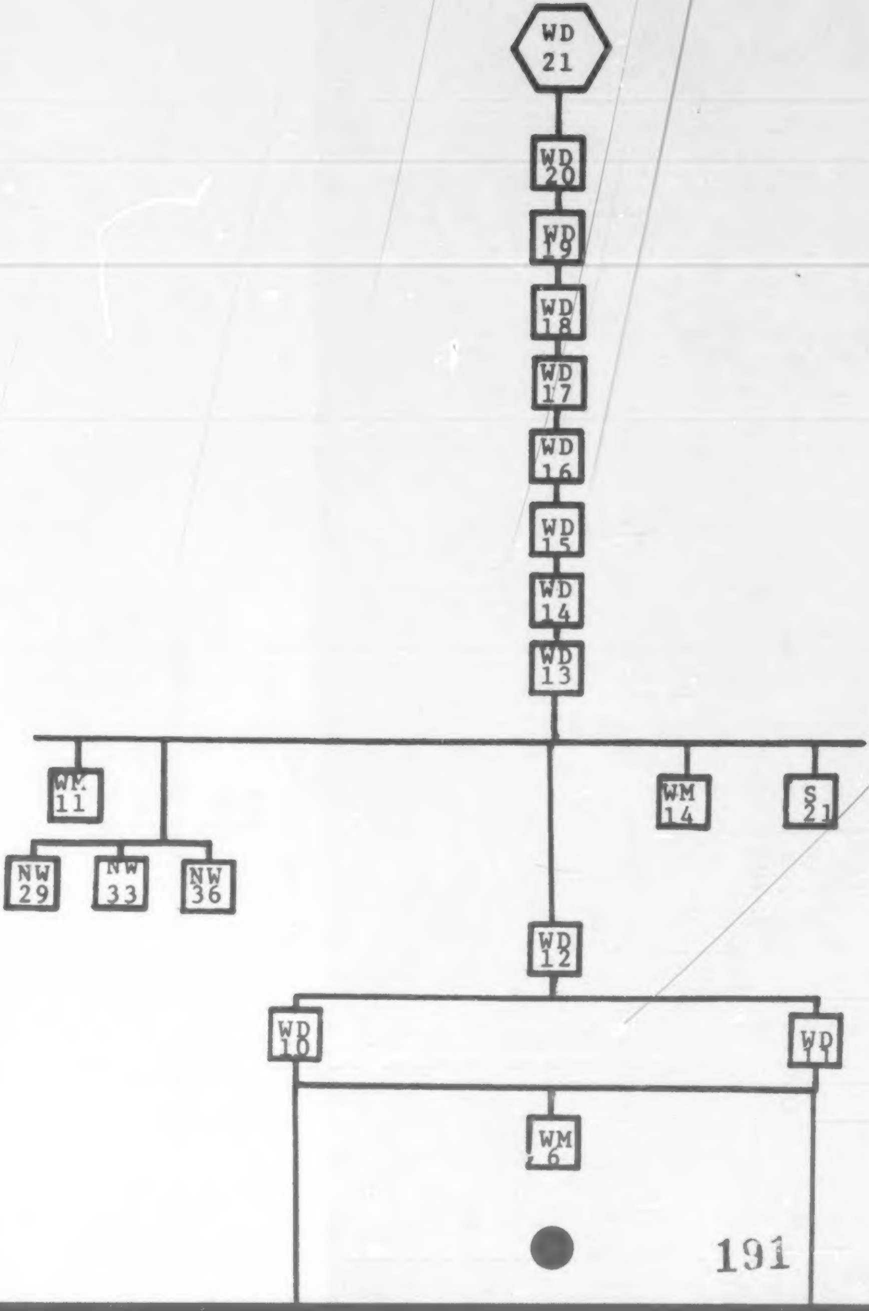
		Pre-K, K	1	2	3	4	5	6
*W-M1.	Any one-digit number and the number two.			X				
*W-M2.	A one-digit number and any one-digit number. (Basic facts) (8 x 9) 9 x 8 (6 x 9) 9 x 6			X				
W-M3.	A two-digit multiple of ten and a one digit number. Limit the product to ninety. 30 x3				X			
W-M4.	A two-digit number and a one-digit number, with no regrouping. 23 x3				X			
W-M5.	A two-digit number and a one-digit number, with regrouping in the ones place only. Limit product to less than 100. 35 23 x2 x4				X			
W-M6.	Any two-digit multiple of ten and a one-digit number. 40 60 90 x3 x4 x5				X			
W-M7.	A two-digit number and a one-digit number with regrouping. 76 99 x3 x2				X			

* Performance criterion: 100% accuracy.

		Pre-K, K	1	2	3	4	5	6
W-M8.	A three-digit multiple of one hundred and a one digit number. (Limit the product to less than one thousand.) 400 x 2 300 x 3				X			
W-M9.	A three-digit number and a one-digit number, with no regrouping. (Limit the product to less than one thousand.) 231 x 3				X			
W-M10.	A three-digit number and a one-digit number, with regrouping from tens to hundreds, only. (Limit the product to less than one thousand.) 243 x 3				X			
W-M11.	Any three-digit multiple of one hundred and one-digit number. 600 x 9				X			
W-M12.	A three-digit number and a one-digit number, with regrouping from the ones place to the tens place and the tens place to the hundreds place. 268 x 5 225 x 4				X			
W-M13.	A four-digit multiple of one thousand and a one-digit number. Limit the product to less than ten thousand. 3000 x 3				X			
W-M14.	Any four-digit multiple of one thousand and any one-digit number. 3000 x 6					X		
W-M15.	A four-digit number and a one-digit number. 4567 x 6					X		

			Pre-K, K	1	2	3	4	5	6
W-M16.	A two-digit multiple of ten and a two-digit multiple of ten.	$\begin{array}{r}20\\ \underline{x30}\end{array}$ $\begin{array}{r}50\\ \underline{x10}\end{array}$					X		
W-M17.	Any two-digit number and a two-digit multiple of ten.	$\begin{array}{r}46\\ \underline{x40}\end{array}$					X		
W-M18.	Two two-digit numbers.	$\begin{array}{r}68\\ \underline{x32}\end{array}$					X		
W-M19.	A three-digit multiple of one hundred and a two-digit multiple of ten.	$\begin{array}{r}400\\ \underline{x30}\end{array}$						X	
W-M20.	Any three-digit number and a two-digit multiple of ten.	$\begin{array}{r}326\\ \underline{x40}\end{array}$						X	
W-M21.	Any three-digit number and a two-digit number.	$\begin{array}{r}468\\ \underline{x25}\end{array}$ $\begin{array}{r}400\\ \underline{x25}\end{array}$						X	
W-M22.	A three-digit number and a three-digit multiple of one hundred.	$\begin{array}{r}468\\ \underline{x200}\end{array}$							X
W-M23.	Two three digit-numbers.	$\begin{array}{r}348\\ \underline{x236}\end{array}$ $\begin{array}{r}217\\ \underline{x305}\end{array}$ $\begin{array}{r}316\\ \underline{x420}\end{array}$							X

WHOLE NUMBERS DIVISION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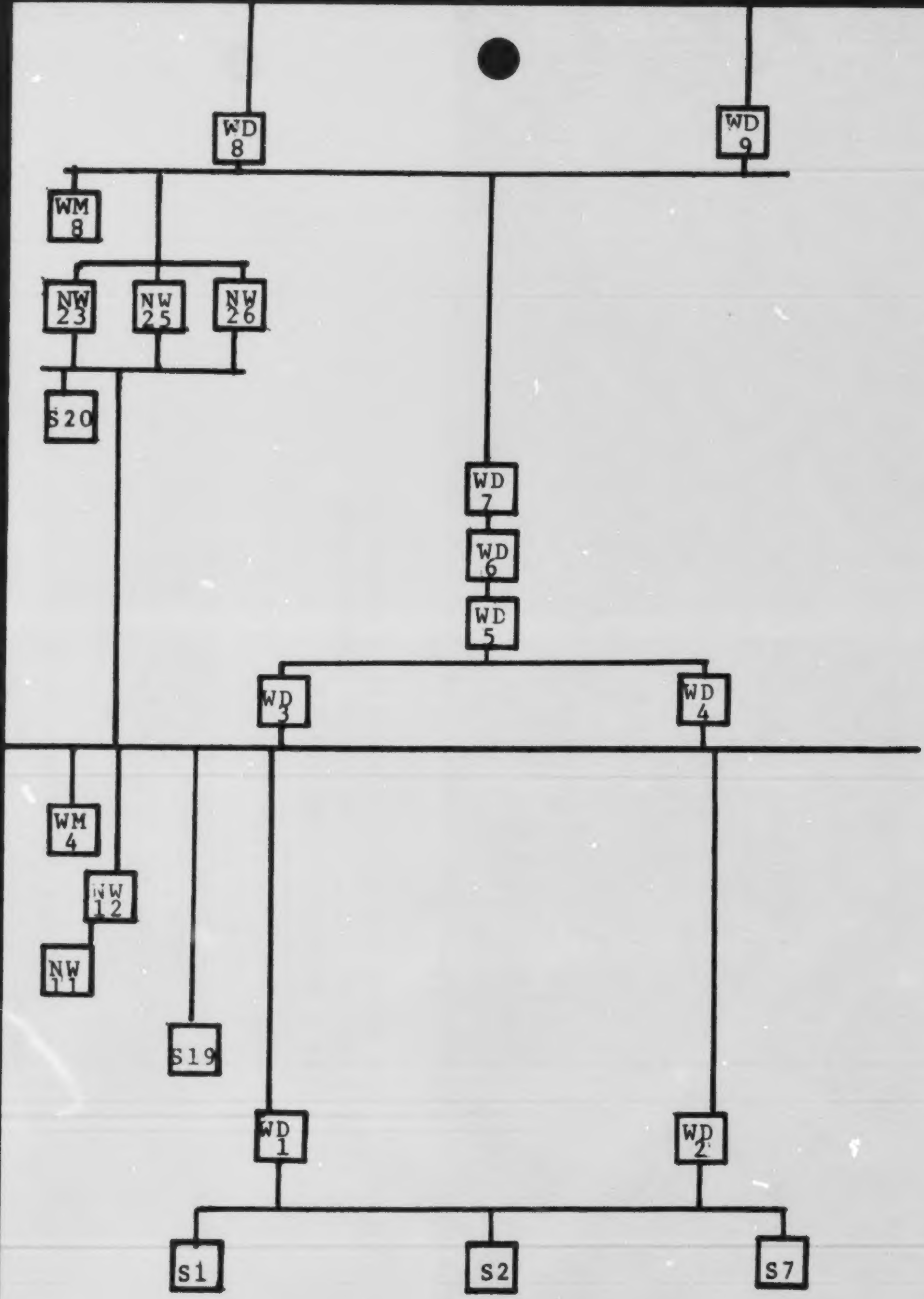
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S2
S7

WHOLE NUMBERS

DIVISION

(W-D)

With successful performance in at least eight out of ten attempts the student will be able to find the quotients for:

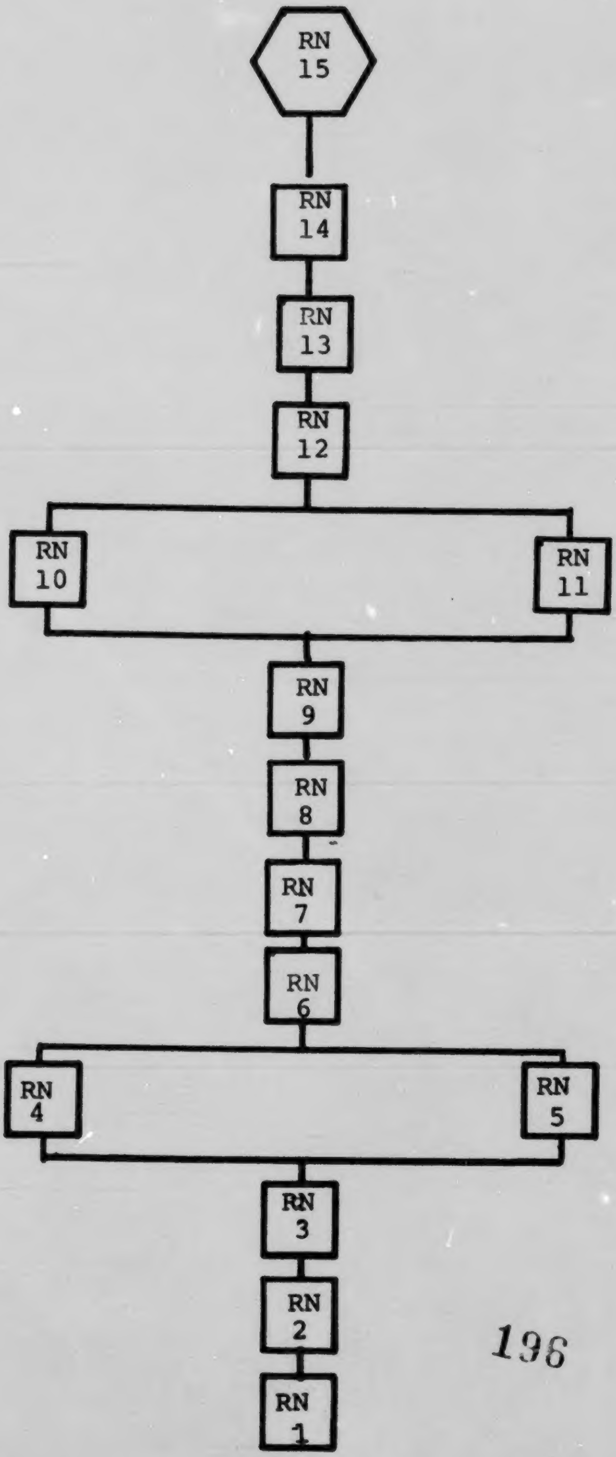
		Pre-K, K	1	2	3	4	5	6
W-D1.	* The division facts that are related to the basic multiplication facts, given two as one of the factors.			X				
W-D2.	* The division facts that are related to the basic multiplication facts. (Basic division facts)				X			
W-D3.	A one- or two-digit number divided by a one-digit number, with a remainder greater than zero. (The quotient is a one-digit number) 6/ 45 3/ 7				X X			
W-D4.	A two-digit multiple of ten divided by a one-digit number. (The quotient is a multiple of ten.) 3/ 30 4/ 80				X			
W-D5.	A two-digit number divided by a one-digit number. (Each digit in the dividend must be a multiple of the divisor.) 3/ 93				X			
W-D6.	A two-digit multiple of ten divided by a one-digit number. (The digit in the tens place in the dividend is not a multiple of the divisor.) 2/ 70 3/ 40				X			
W-D7.	Any two-digit number divided by a one-digit number. 2 / 47 3 / 68 5/ 80				X			
W-D8.	A three-digit multiple of one hundred divided by a one-digit number. (The quotient is a multiple of one hundred.) 3/ 300 4/ 800				X			

* Performance criterion: 100% accuracy

		Pre-K, K	1	2	3	4	5	6
W-D9.	A three-digit number divided by a one-digit number. Each digit in the dividend is a multiple of the divisor. $3\overline{)\,936}$				X			
W-D10.	A three-digit multiple of one hundred divided by a one-digit number. (The number in the hundreds place in the dividend is not a multiple of the divisor.) (Quotient is a three-digit number) $4\overline{)\,700}$ $3\overline{)\,400}$				X			
W-D11.	A three-digit number divided by a one-digit number. (The quotient is a three-digit number.) $3\overline{)\,743}$ $4\overline{)\,827}$				X			
W-D12.	A three-digit number divided by a one-digit number. (The quotient is a two-digit number.) $2\overline{)\,158}$ $4\overline{)\,127}$ $6\overline{)\,437}$				X			
W-D13.	A number containing four or more digits divided by a one-digit number. $2\overline{)\,4637}$				X			
W-D14.	A two-digit number divided by a two-digit multiple of ten. $20\overline{)\,68}$ $40\overline{)\,70}$ $30\overline{)\,90}$					X		
W-D15.	A two-digit number divided by a two-digit number. The divisor is less than or equal to the dividend. $21\overline{)\,21}$ $23\overline{)\,64}$					X		
W-D16.	A three-digit number divided by a two-digit multiple of ten. (The quotient is a two-digit number.) $20\overline{)\,600}$ $30\overline{)\,510}$ $40\overline{)\,986}$					X		
W-D17.	A three-digit number divided by a two-digit number. (The quotient is a two-digit number.)					X		

		Pre-K, K	1	2	3	4	5	6
W-D18.	A three-digit number divided by a two-digit multiple of ten. (The quotient is a one-digit number.) 20/ 185 30/ 246 40/ 150					X		
W-D19.	A three-digit number divided by a two-digit number. (The quotient is a one-digit number.) 24/ 206 30/ 192					X		
W-D20.	Any number having four or more digits, divided by a two-digit multiple of ten. 20/4678 30/24597						X	
W-D21.	Any number having four or more digits divided by a two-digit number. 32/ 6145 68/45898							X

RATIONAL NUMBERS
COMMON AND DECIMAL FRACTIONS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RN 6
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RN 5
RN 3
RN 2
RN 1

196

RATIONAL NUMBER (CONCEPTS)

(RN)

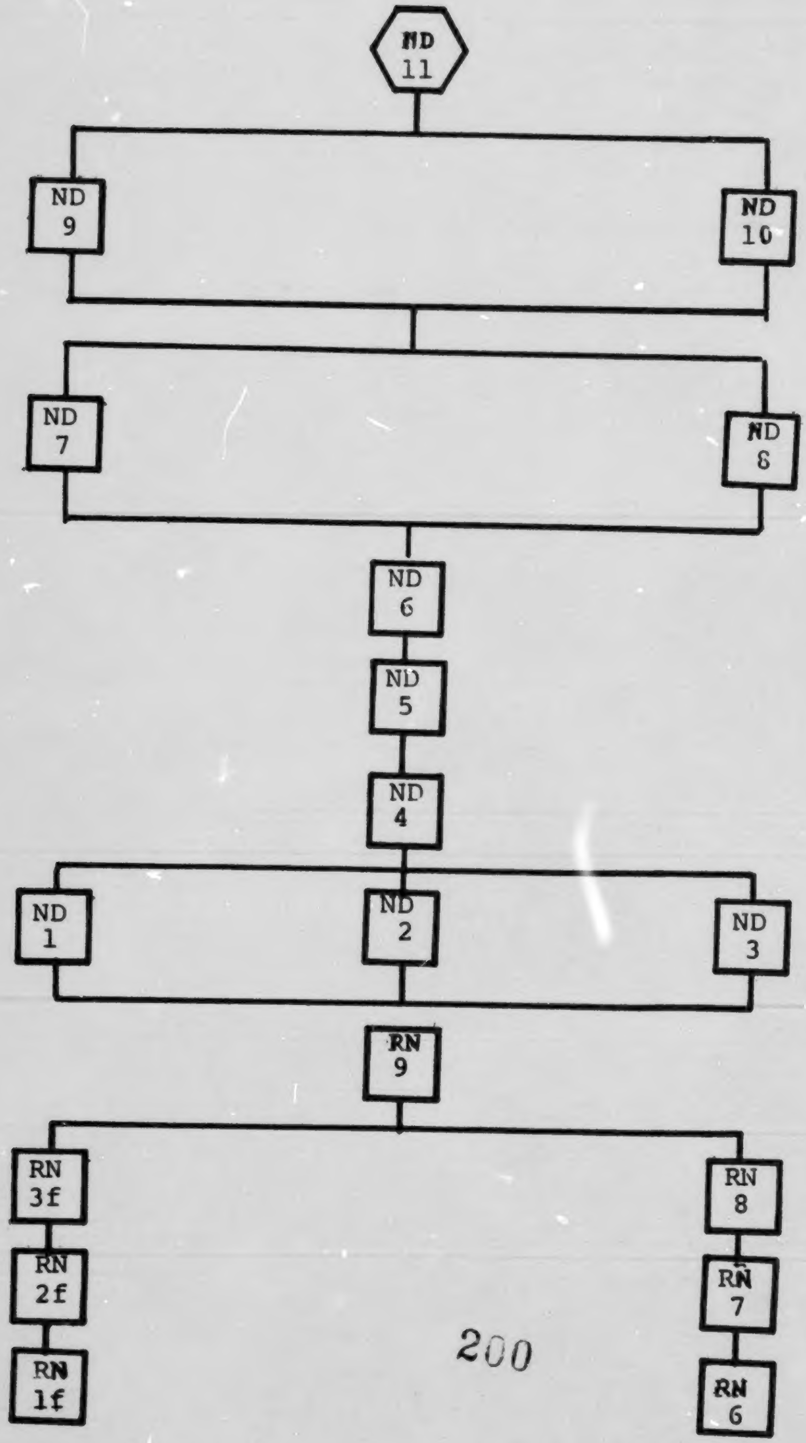
	The student will be able to:	Pre-K, K	1	2	3	4	5	6
RN-1.	Identify:							
	a. One-half of ONE as one of two equivalent parts.	X	M					
	b. One-third of ONE as one of three equivalent parts.	X	M					
	c. One-fourth of ONE as one of four equivalent parts.	X	M					
	d. One-sixth of ONE as one of six equivalent parts.			X	M	__________.		
	e. One-eighth of ONE as one of eight equivalent parts.			X	M	__________.		
	f. One-tenth of ONE as one of ten equivalent parts.			X	M	__________.		
RN-2.	Identify, read, and write the common fractional numeral for one of:							
	a. Two equivalent parts of ONE (1/2)	X	M					
	b. Three equivalent parts of ONE. (1/3)	X	M					
	c. Four equivalent parts of ONE. (1/4)	X	M					
	d. Six equivalent parts of ONE. (1/6)			X	M	__________.		
	e. Eight equivalent parts of ONE. (1/8)			X	M	__________.		
	f. Ten equivalent parts of ONE. (1/10)			X	M	__________.		
RN-3.	Identify:							
	a. Two-halves (2/2) as two of the two equivalent parts or ONE.			X	M	__________.		
	b. Three-thirds (3/3) as three of the three equivalent parts or ONE.			X	M	__________.		
	c. Four-fourths (4/4) as four of the four equivalent parts or ONE.			X	M	__________.		
	d. Six-sixths (6/6) as six of the six equivalent parts or ONE.			X	M	__________.		
	e. Eight-eighths (8/8) as eight of the eight equivalent parts or ONE.			X	M	__________.		
	f. Ten-tenths (10/10) as ten of the ten equivalent parts or ONE.			X	M	__________.		
RN-4.	Identify and name the number for: Limit the number of the given sets to twelve or fewer members							

		Pre-K, K	1	2	3	4	5	6
	a. One half of a given set. (Limit number of given set to multiples of two.)				X	M		_____.
	b. One fourth of a given set. (Limit the number of the given sets to multiples of four.)				X	M		_____.
	c. One third of a given set. (Limit the number of the given sets to multiples of three.)				X	M		_____.
RN-5.	Find a fractional part of a given set. Number of the given set is a multiple of the fraction denominator.					X	M	____.
RN-6.	Identify:							
	a. One hundredth of ONE as one of one hundred equivalent parts. (1/100) (.01)				X	M		_____.
	b. One thousandth of ONE as one of one thousand equivalent parts. (1/1000) (.001)					X	M	____.
RN-7.	Identify, read, and write the common fractional numeral for:							
	a. One of one hundred equivalent parts of ONE (1/100) (.01)				X	M		_____.
	b. One of one thousand equivalent parts of ONE (1/1000) (.001)					X	M	____.
RN-8.	Identify:							
	a. One hundred-hundredths (100/100) as one hundred of the one hundred equivalent parts or ONE.				X	M		_____.
	b. One thousand-thousandths (1000/1000) as one thousand of the one thousand equivalent parts or ONE.					X	M	____.
RN-9.	Identify and name more than one equivalent part of one.							
RN-10.	Identify, read, and write the numeral for more than one of the equivalent parts of ONE. (Limit fraction numeral to less than one.) 2/3 3/10 7/100 715/1000				X	M		_____.
RN-11.	Name the terms of a common fraction whose value is less than or equal to ONE.					X	M	____.
RN-12.	Classify fractions: a. Equal to ONE. b. Less than ONE. c. Greater than ONE.					X	M	____.

198

		Pre-K, K	1	2	3	4	5	6
RN-13.	Identify and write different names for a given fraction as shown by physical models and/or diagrams. Write the numeral as a common fraction.					X	M	___.
	a. Fraction whose value is less than or equal to ONE.							
	b. Fraction whose value is greater than ONE.					X	M	___.
RN-14.	Distinguish between like and unlike fractions.					X	M	___.
RN-15.	Use physical models to order like fractions.					X	M	___.

NUMERATION - DECIMALS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ND 3
RN 9
RN 3f
RN 8
RN 2f
RN 7
RN 1f
RN 6

200

NUMERATION

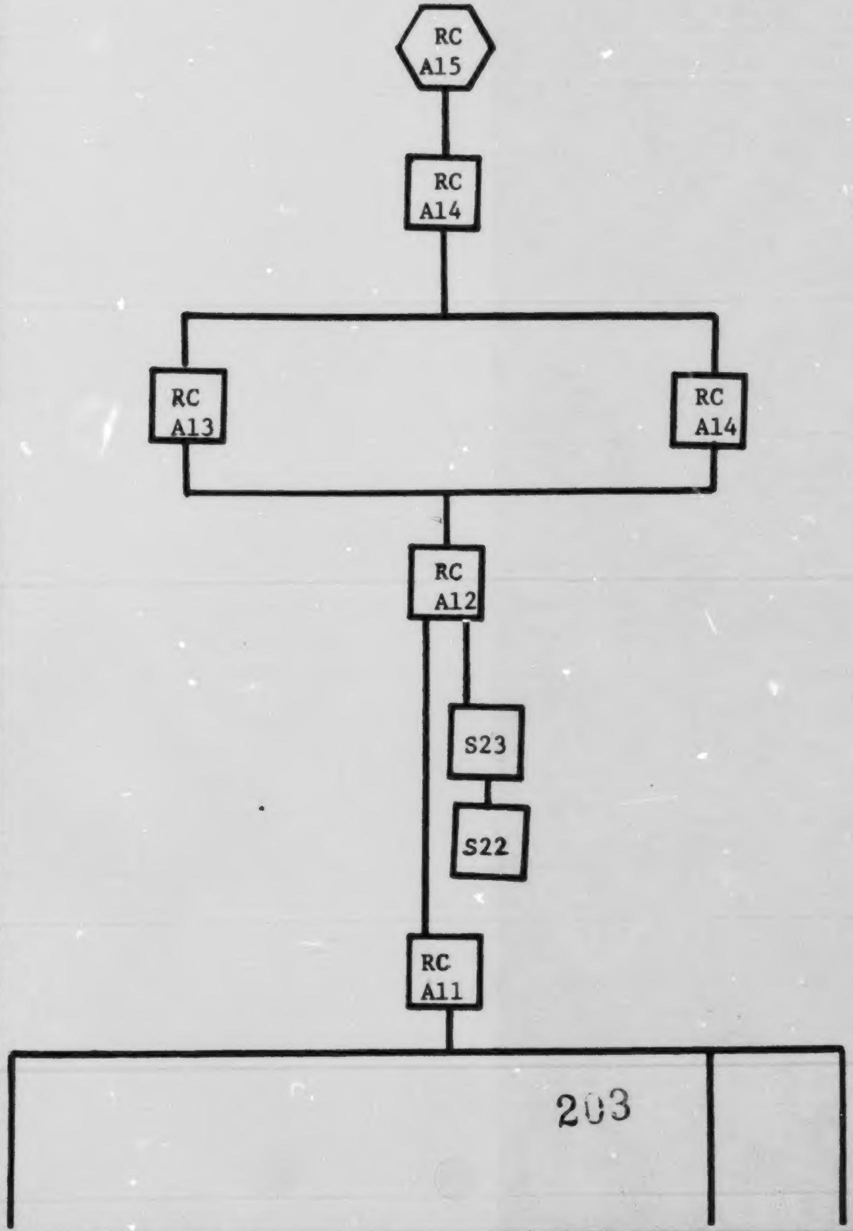
DECIMALS

(ND)

	The student will be able to:	Pre-K, K	1	2	3	4	5	6
ND-1.	Name the place value of the first digit to the right of the ones place in a mixed decimal fraction. 2.8 25.6 372.9							X
ND-2.	Name the place value of the second digit to the right of the decimal point in a mixed decimal fraction. 2.86 25.67 372.94							X
ND-3.	Name the place value of the third digit to the right of the decimal point in a mixed decimal fraction. 2.863 25.674 372.945							X
ND-4.	Identify, read, and write decimal fractions through thousandths.							X
ND-5.	Read and write any mixed decimal fraction. (tenths, hundredths, or thousandths.)							X
ND-6.	Name the place value of any specified digit in a mixed decimal fraction. (Limit decimal to the thousandths place.)							X
ND-7.	Write any given decimal fraction or mixed decimal fraction in expanded notation. (Limit the decimal fraction to the thousandths place.) 3.1 = 3 + .1 43.476 = 43 + .4 + .07 + .006							X
ND-8.	Compare two fractional numbers in decimal notation to determine which is greater or which is less. (Limit the decimal fraction to the thousandths place.)							X
ND-9.	Rename as hundredths a decimal fraction named as tenths. .2 = .20							X

		Pre-K, K	1	2	3	4	5	6
ND-10.	Rename as thousandths a decimal fraction named in tenths. .2 = .200							X
ND-11.	Round off a decimal fraction to a specified decimal place.							X

RATIONAL NUMBERS
COMMON FRACTIONS - ADDITION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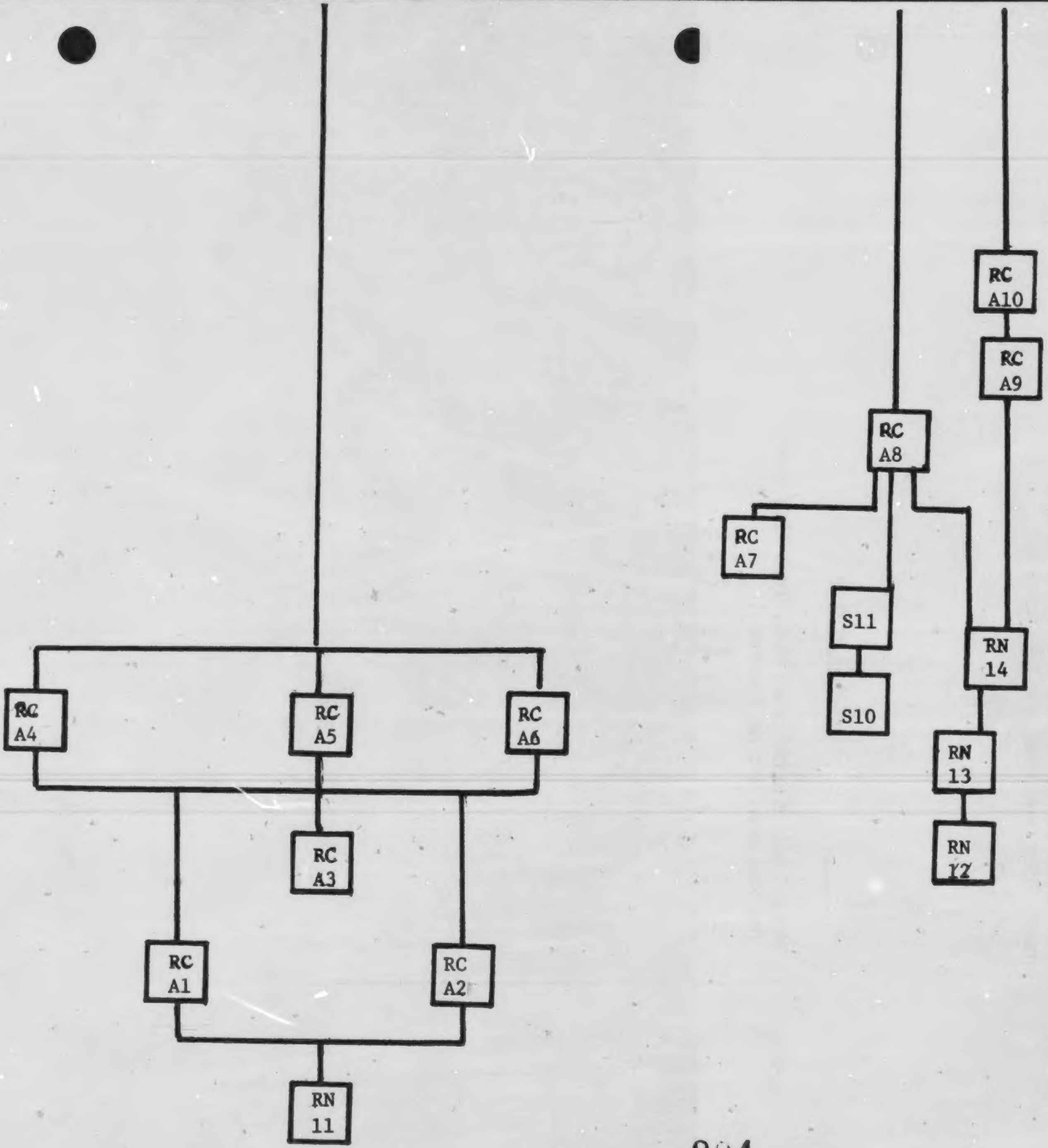
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RC A5
RC A6
RC A3
RC A1
RC A2
RN 11

RATIONAL NUMBERS COMMON FRACTIONS

ADDITION

Pre-K,
K 1 2 3 4 5 6

With successful performance in at least eight out of ten attempts, the student will be able to construct the sum of:

RC-A1. Two like, common fractions, less than one. (The sum need not be renamed.)

$(\frac{1}{4} + \frac{2}{4})$ $(\frac{5}{6} + \frac{2}{6})$

$$\begin{array}{r} \frac{1}{4} \\ +\frac{2}{4} \\ \hline \end{array} \qquad \begin{array}{r} \frac{5}{6} \\ +\frac{2}{6} \\ \hline \end{array}$$

X (4)

RC-A2. Three like, common fractions, less than one. (The sum need not be renamed.)

$(\frac{1}{8} + \frac{2}{8} + \frac{4}{8})$ $(\frac{1}{3} + \frac{2}{3} + \frac{2}{3})$ $(\frac{1}{4} + \frac{2}{4} + \frac{3}{4})$ X (4)

RC-A3. A whole number and a common fraction less than one.

$(2 + \frac{3}{4})$ $(8 + \frac{2}{6})$ $(10 + \frac{5}{8})$ X (4)

RC-A4. A whole number and a mixed number that contains a common fraction that has a value of less than one.

$(5 + 3\frac{1}{4})$

$$\begin{array}{r} 7 \\ +6\frac{3}{5} \\ \hline \end{array}$$

X (4)

RC-A5. A mixed number and a common fraction. (The fractions are like and the value is less than one. Sum need not be renamed.)

$$\begin{array}{r} 2\frac{1}{3} \\ +\frac{2}{3} \\ \hline \end{array} \qquad (5\frac{3}{8} + \frac{7}{8}) \qquad \begin{array}{r} 4\frac{1}{10} \\ +\frac{2}{10} \\ \hline \end{array}$$

X (4)

RC-A6. Two mixed numbers that contain like fractions less than one. (The sum need not be renamed.)

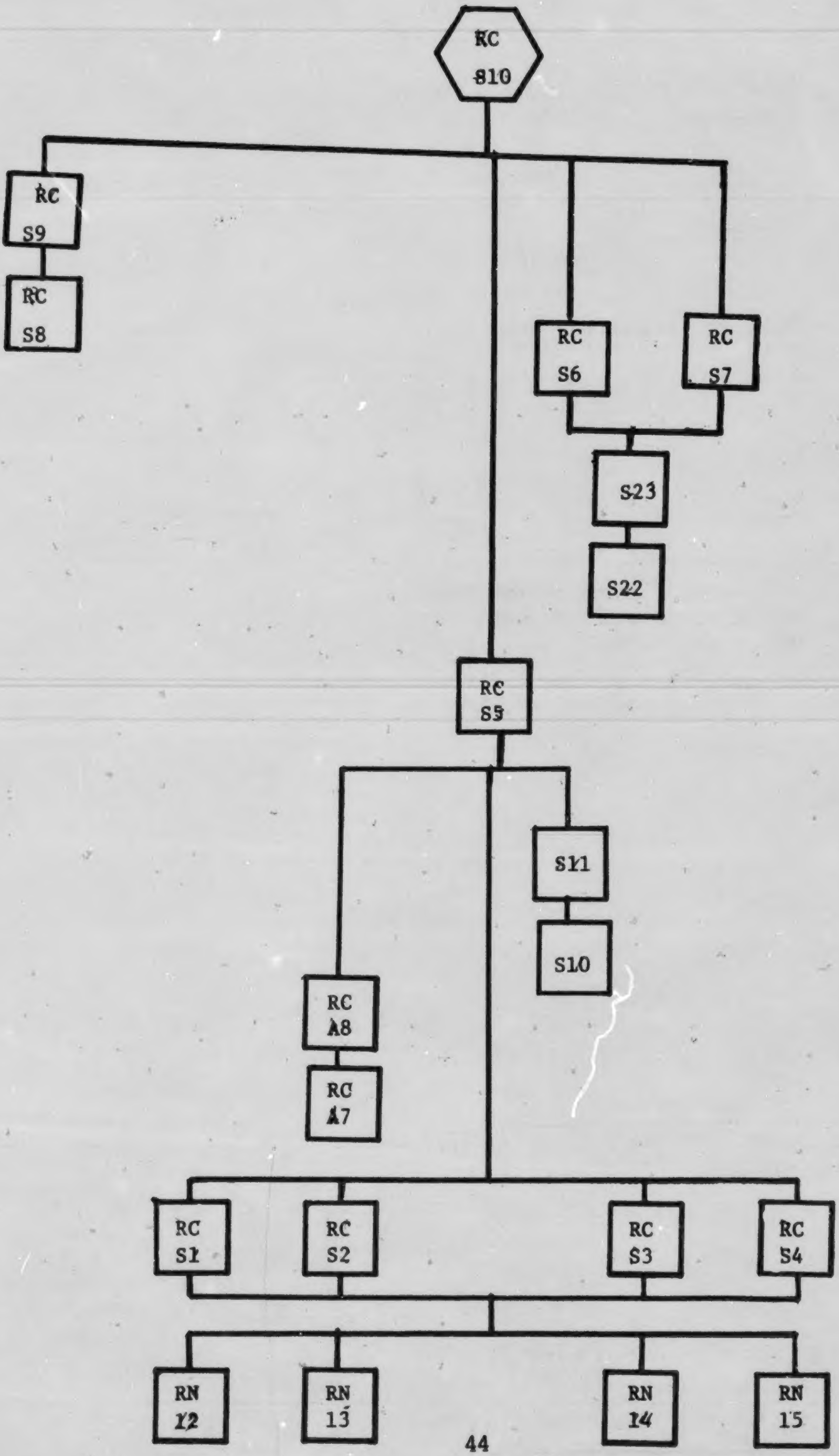
$(2\frac{3}{4} + 2\frac{3}{4})$ X (4)

		Pre-K, K	1	2	3	4	5	6
	$\begin{array}{r} 3\frac{1}{4} \\ +\ 2\frac{1}{4} \\ \hline \end{array}$ $\quad$ $\begin{array}{r} 3\frac{1}{4} \\ +\ 2\frac{3}{4} \\ \hline \end{array}$					X		
RC-A7.	* Multiply a common fraction by a common fraction. $(\frac{1}{2} \times \frac{2}{x})$ $\quad$ $(\frac{3}{6} \times \frac{3}{3})$						X	M
RC-A8.	* Rename a given fraction, less than one, as an equivalent fraction in higher terms or lower terms. $\frac{1}{2} = \frac{4}{8}, \frac{1}{3} = \frac{2}{6}, \frac{1}{4} = \frac{5}{20}, \frac{4}{8} = \frac{1}{2}, \frac{2}{6} = \frac{1}{3}, \frac{5}{20} = \frac{1}{4}$						X	M
RC-A9.	* Rename a fraction, greater than or equal to one, as a mixed number or a whole number. $\frac{10}{4} = 2\frac{2}{4} = 2\frac{1}{2}, \frac{6}{3} = 2, \frac{5}{5} = 1$						X	M
RC-A10.	* Rename a mixed number containing a fraction equal to or greater than one, in simplest form. $6\frac{10}{4} = 8\frac{1}{2}; \quad 3\frac{5}{5} = 4; \quad 2\frac{8}{4} = 4$						X	M
RC-A11.	Any combination of like, common fractions. Rename the sum in simplest form.						X	M
RC-A12.	Two unlike common fractions - value less than one. (Rename the sum in simplest form.) $\begin{array}{r} \frac{2}{3} \\ +\ \frac{1}{6} \\ \hline \end{array}$ $\quad$ $\begin{array}{r} \frac{3}{4} \\ +\ \frac{5}{6} \\ \hline \end{array}$						X	M
RC-A13.	A common fraction and a mixed number. (The fractions are unlike and the value is less than one.) $\begin{array}{r} 3\frac{2}{3} \\ +\ \frac{1}{9} \\ \hline \end{array}$ $\quad$ $(\frac{1}{12} + 4\frac{1}{3})$						X	M

** Perform these operations as a preprequisite, for constructing sums with certain rationals.

		Pre-K, K	1	2	3	4	5	6
RC-A14.	Mixed numbers that contain common fractions. $\begin{array}{r} 3\frac{3}{4} \\ +\,2\frac{3}{8} \\ \hline \end{array}$ $\qquad$ $\begin{array}{r} 2\frac{1}{5} \\ 3\frac{4}{10} \\ 6\frac{1}{2} \\ \hline \end{array}$						X	M
RC-A15.	Three unlike, common fractions. $\begin{array}{r} \frac{2}{3} \\ \frac{1}{6} \\ +\,\frac{2}{9} \\ \hline \end{array}$ $\qquad (\frac{2}{3} + \frac{1}{2} + \frac{1}{4}) \qquad$ $\begin{array}{r} \frac{2}{5} \\ \frac{3}{7} \\ +\,\frac{1}{2} \\ \hline \end{array}$						X	M
RC-A16.	Any combination of common fractions and/or mixed numbers that contain common fractions.						X	M

RATIONAL NUMBERS
COMMON FRACTIONS - SUBTRACTION


RC S10
RC S9
RC S8
RC S6
RC S7
S23
S22
RC S5
S11
S10
RC A8
RC A7
RC S1
RC S2
RC S3
RC S4
RN 12
RN 13
RN 14
RN 15

RATIONAL NUMBERS

COMMON FRACTIONS - SUBTRACTION

(RC-S)

Pre-K,
K 1 2 3 4 5 6

With successful performance in at least eight out of ten attempts, the student will be able to find the difference of:

RC-S1. A common fraction and a common fraction with like denominators. (The value of each fraction is less than one. The missing addend need not be renamed.)

$\frac{3}{4} - \frac{3}{4} = \square$ $\frac{3}{5} - \frac{1}{5} = \square$

$$\begin{array}{r} \frac{3}{4} \\ -\frac{3}{4} \\ \hline \end{array} \qquad \begin{array}{r} \frac{3}{5} \\ -\frac{1}{5} \\ \hline \end{array}$$

X

RC-S2. A whole number and a mixed number. (The missing addend need not be renamed.)

$6\frac{3}{4} - 5 + \square$ $6\frac{3}{4} - 6 = \square$

$$\begin{array}{r} 6\frac{3}{4} \\ -5 \\ \hline \end{array} \qquad \begin{array}{r} 6\frac{3}{4} \\ -6 \\ \hline \end{array}$$

X

RC-S3. A common fraction and a mixed number, with no regrouping. (Use only like fractions.) (The missing addend need not be renamed.)

$$\begin{array}{r} 2\frac{3}{4} \\ -\frac{1}{4} \\ \hline \end{array} \qquad \begin{array}{r} 2\frac{3}{4} \\ -\frac{3}{4} \\ \hline \end{array}$$

X

RC-S4. A mixed number and a mixed number, with no regrouping. (Use only like fractions.) (The missing addend need not be renamed.)

Pre-K,
K 1 2 3 4 5 6

$5\frac{3}{5} - 3\frac{1}{5} = \square$ $5\frac{3}{5} - 5\frac{3}{5} = \square$ X

$$\begin{array}{r} 5\frac{3}{5} \\ -\,3\frac{1}{5} \\ \hline \end{array} \qquad \begin{array}{r} 5\frac{3}{5} \\ -\,5\frac{3}{5} \\ \hline \end{array}$$

RC-S5. Pairs of common fractions and/or mixed numbers. (Use only like fractions.)

$$\begin{array}{r} 4\ \frac{3}{4} \\ -\,2\ \frac{1}{4} \\ \hline \end{array} \qquad 4\frac{2}{4} - 2\frac{1}{4} = \square$$

$$\begin{array}{r} \frac{9}{12} \\ -\,\frac{7}{12} \\ \hline \end{array} \qquad \frac{9}{12} - \frac{7}{12} = \square$$

X

RC-S6. A common fraction and a common fraction with an unlike denominator. (The value of each fraction is less than one.)

$$\begin{array}{r} \frac{3}{4} \\ -\,\frac{1}{2} \\ \hline \end{array} \qquad \begin{array}{r} \frac{5}{8} \\ -\,\frac{1}{6} \\ \hline \end{array} \qquad \begin{array}{r} \frac{3}{4} \\ -\,\frac{3}{5} \\ \hline \end{array}$$

X M

$\frac{3}{4} - \frac{1}{2} = \square$ $\frac{5}{8} - \frac{1}{6} = \square$ $\frac{3}{4} - \frac{3}{5} = \square$

RC-S7. A common fraction or a mixed number and a mixed number, with no regrouping. (The fractions should be unlike.)

$$\begin{array}{r} 4\frac{3}{4} \\ -\,\frac{1}{2} \\ \hline \end{array} \qquad 4\frac{3}{4} - \frac{1}{2} = \square$$

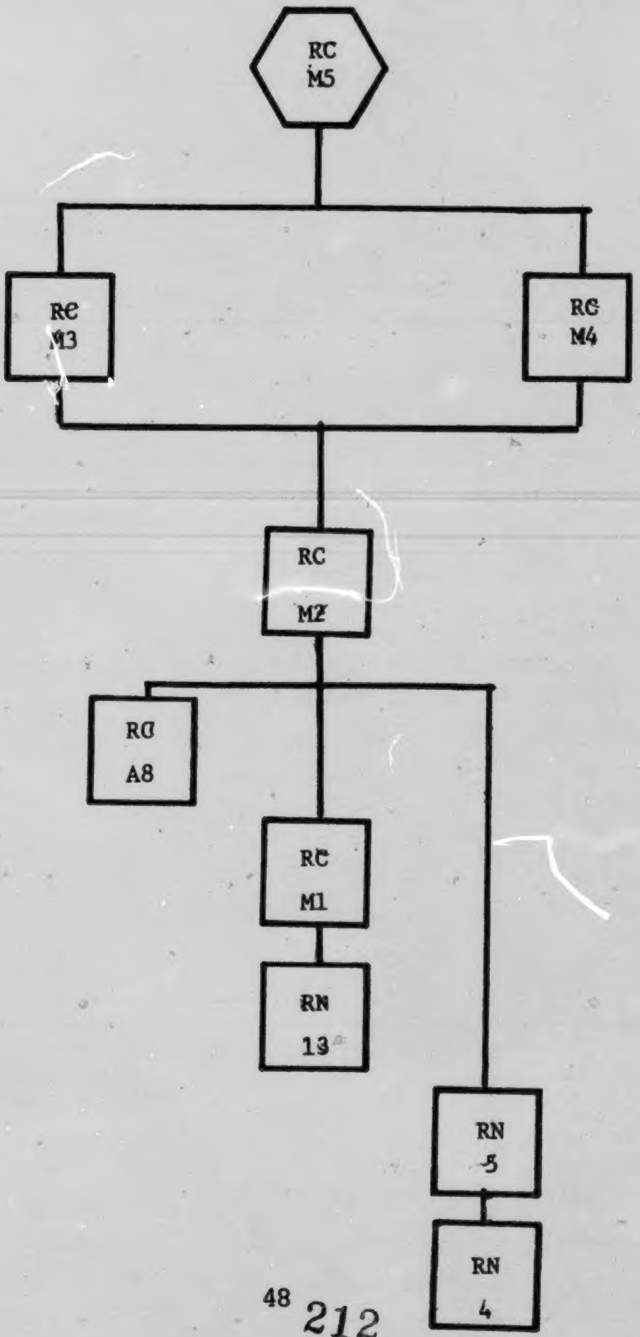
$$\begin{array}{r} 5\frac{5}{6} \\ -\,1\frac{1}{2} \\ \hline \end{array} \qquad 5\frac{5}{6} - 1\frac{1}{2} = \square$$

X M

		Pre-K, K	1	2	3	4	5	6
RC-S8.	** Rename a whole number as a mixed number, containing a common fraction equal to one. $6 = 5\frac{4}{4}$; $6 = 5\frac{5}{5}$; $6 = 5\frac{3}{3}$						X	M
RC-S9.	A common fraction or a mixed number and a whole number. $\begin{array}{r} 6 \\ -\frac{2}{3} \\ \hline \end{array}$ $\begin{array}{r} 7 \\ -2\frac{1}{5} \\ \hline \end{array}$ $6 - \frac{2}{3} =$ $7 - 2\frac{1}{5} =$						X	M
RC-S10.	A common fraction or a mixed number and a mixed number. $\begin{array}{r} 7\frac{1}{4} \\ -\frac{3}{4} \\ \hline \end{array}$ $\begin{array}{r} 8\frac{1}{4} \\ -2\frac{1}{2} \\ \hline \end{array}$ $7\frac{1}{4} - \frac{3}{4} =$ $8\frac{1}{4} - 2\frac{1}{2} =$						X	M

** Perform this operation as a prerequisite for subtraction of certain rationals.

RATIONAL NUMBERS - COMMON FRACTIONS
MULTIPLICATION


RC
M5
RC
M3
RC
M4
RC
M2
RC
A8
RC
M1
RN
13
RN
5
RN
4

RATIONAL NUMBERS

COMMON FRACTIONS - MULTIPLICATION

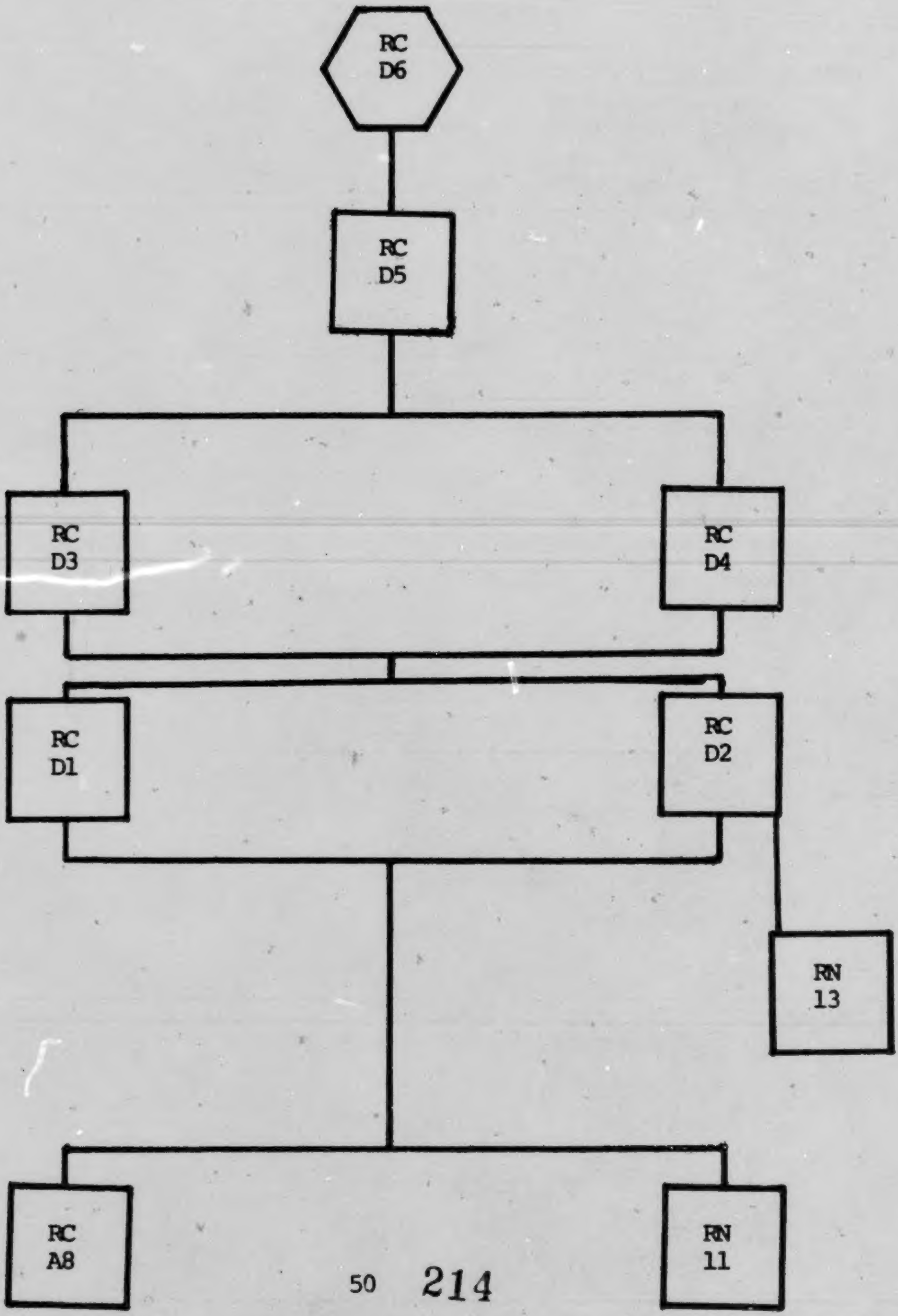
(RC-M)

With successful performance in at least eight out of ten attempts, the student will be able to construct products of:

		Pre-K, K	1	2	3	4	5	6
RC-M1.	A common fraction and a common fraction. (Rename product in lowest terms.)						X	M
RC-M2.	A whole number and a common fraction. (Rename product in lowest terms.) $(\frac{2}{3} \times 6)$ $(6 \times \frac{2}{3})$						X	M
RC-M3.	A whole number and a mixed number. (Rename product in lowest terms.) $(3\frac{1}{2} \times 4)$ $\begin{array}{r} 4 \\ \times\ 3\frac{1}{2} \\ \hline \end{array}$						X	M
RC-M4.	A common fraction and a mixed number. (Rename product in lowest terms.) $(\frac{1}{4} \times 2\frac{1}{3})$ $\begin{array}{r} 2\frac{1}{3} \\ \times\ \frac{1}{4} \\ \hline \end{array}$						X	M
RC-M5.	Two mixed numbers. (Rename product in lowest terms.) $\begin{array}{r} 7\frac{3}{5} \\ \times\ 4\frac{2}{3} \\ \hline \end{array}$						X	M

RATIONAL NUMBERS - COMMON FRACTIONS

DIVISION


RC D6
RC D5
RC D3
RC D4
RC D1
RC D2
RN 13
RC A8
RN 11

RATIONAL NUMBERS

COMMON FRACTIONS - DIVISION

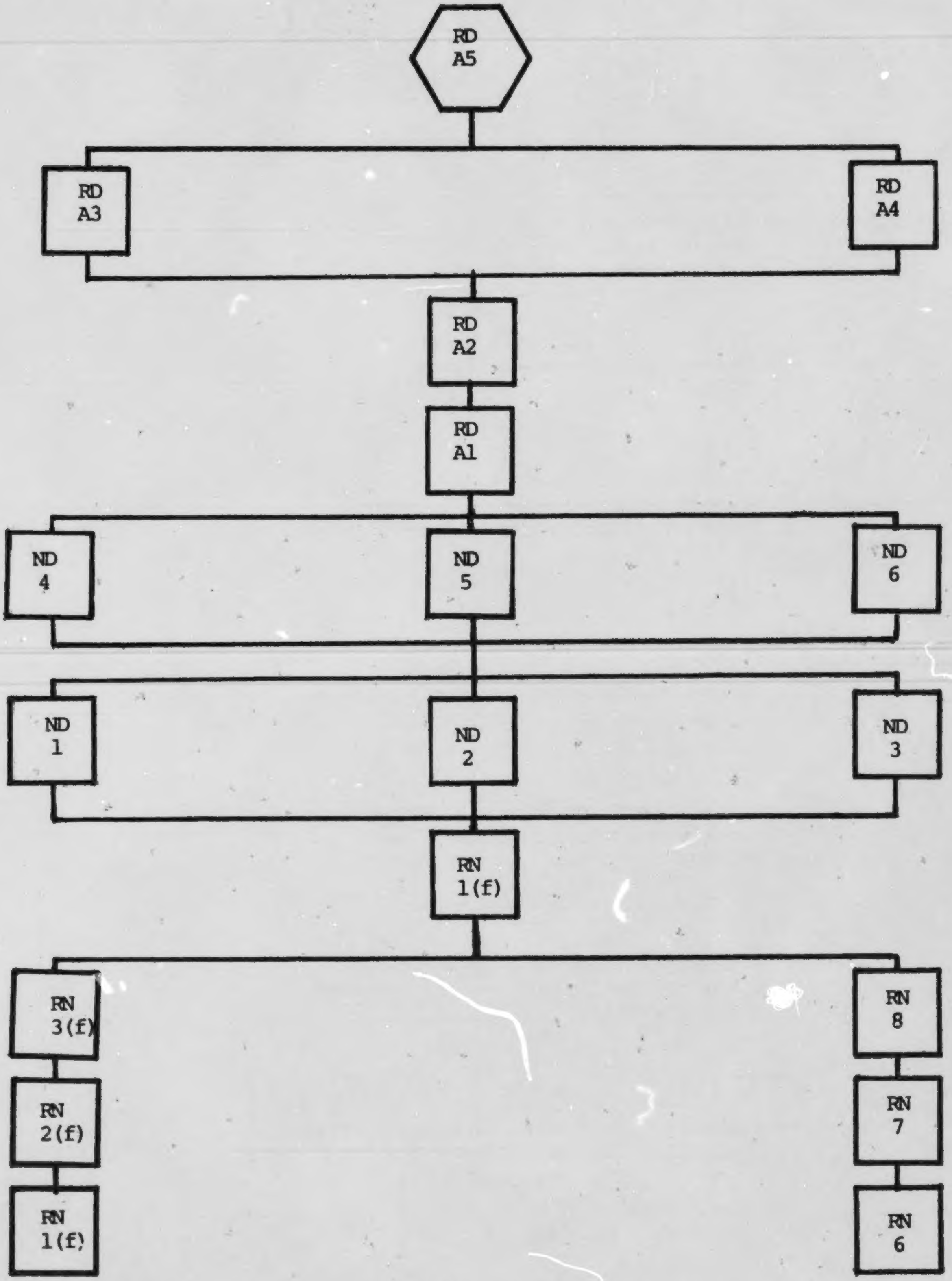
(RC-D)

With successful performance in at least eight out of ten attempts, the student will be able to find the quotient for:

		Pre-K, K	1	2	3	4	5	6
RC-D1.	A fraction divided by a fraction. (Rename the quotient in lowest terms.) $\frac{5}{8} : \frac{3}{6} = \frac{5}{8} \times \frac{6}{3} = \frac{30}{24} = 1\frac{1}{4}$							X
RC-D2.	A whole number divided by a unit fraction. (Rename the quotient in lowest terms.) $(4 \div \frac{1}{4})$ $(4 \div \frac{1}{3})$							X
RC-D3.	A whole number divided by a fraction and a fraction by a whole number. (Rename the quotient in lowest terms.) $7 \div \frac{3}{8} = \square$ $\frac{3}{8} \div 7 = \square$							X
RC-D4.	A mixed number divided by a whole number, and a whole number by a mixed number. (Rename the quotient in lowest terms.) $4\frac{2}{3} \div 2 = \square$ $2 \div 4\frac{2}{3} = \square$							X
RC-D5.	A mixed number divided by a fraction, and a fraction by a mixed number. (Rename the quotient in lowest terms.) $7\frac{1}{8} \div \frac{2}{3} = \square$ $\frac{4}{5} \div 2\frac{2}{3} = \square$							X
RC-D6.	A mixed number divided by a mixed number. (Rename the quotient in lowest terms.) $2\frac{1}{4} \div 4\frac{5}{6} = \square$							X

RATIONAL NUMBERS - DECIMALS

ADDITION


RD A5
RD A3
RD A4
RD A2
RD A1
ND 4
ND 5
ND 6
ND 1
ND 2
ND 3
RN 1(f)
RN 3(f)
RN 8
RN 2(f)
RN 7
RN 1(f)
RN 6

RATIONAL NUMBERS

DECIMALS - ADDITION

(RD-A)

Pre-K,
K 1 2 3 4 5 6

With successful performance in at least eight out of ten attempts the student will be able to construct the sum of:

RD-1. Decimal fractions.
(Limit the sum to less than one.)

$$\begin{array}{r} .4 \\ +.5 \\ \hline \end{array} \qquad \begin{array}{r} .03 \\ .02 \\ +.04 \\ \hline \end{array} \qquad \begin{array}{r} .003 \\ .172 \\ +.310 \\ \hline \end{array}$$

X (6)

RD-A2. Any decimal fractions.

$$\begin{array}{r} .2 \\ .3 \\ +\ .8 \\ \hline \end{array} \qquad \begin{array}{r} .02 \\ .03 \\ +.05 \\ \hline \end{array} \qquad \begin{array}{r} .002 \\ .923 \\ +.231 \\ \hline \end{array}$$

X (6)

RD-A3. Two mixed numbers that contain decimal fractions.

$$\begin{array}{r} 4.3 \\ +\ 19.5 \\ \hline \end{array}$$

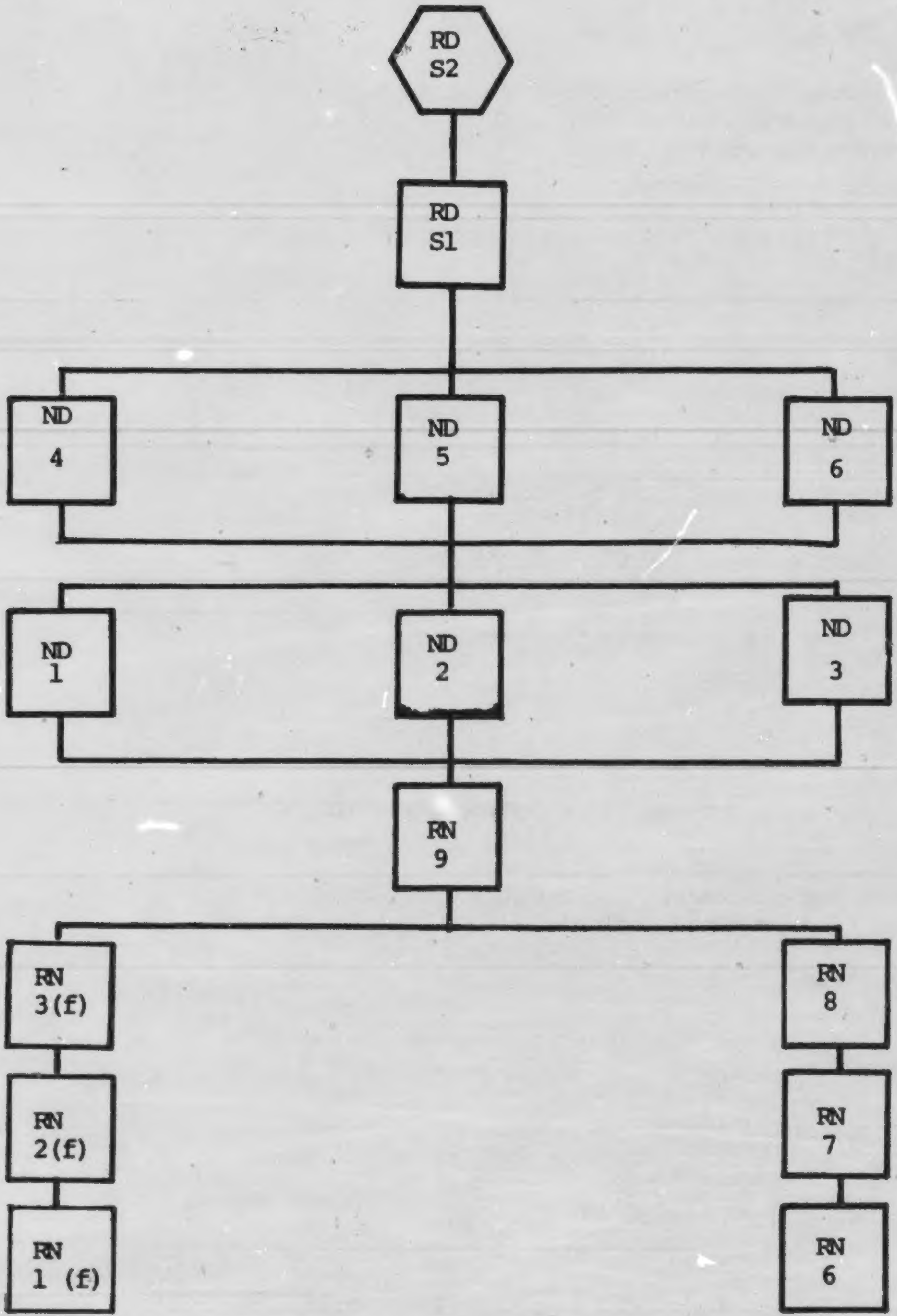
X (6)

RD-A4. A whole number and a decimal fraction. X (6)

RD-A5. Any combination of decimal fractions and/or mixed decimals. X (6)

RATIONAL NUMBERS - DECIMALS

SUBTRACTION


RD S2
RD S1
ND 4
ND 5
ND 6
ND 1
ND 2
ND 3
RN 9
RN 3(f)
RN 2(f)
RN 1 (f)
RN 8
RN 7
RN 6

218

RATIONAL NUMBERS

DECIMALS - SUBTRACTION

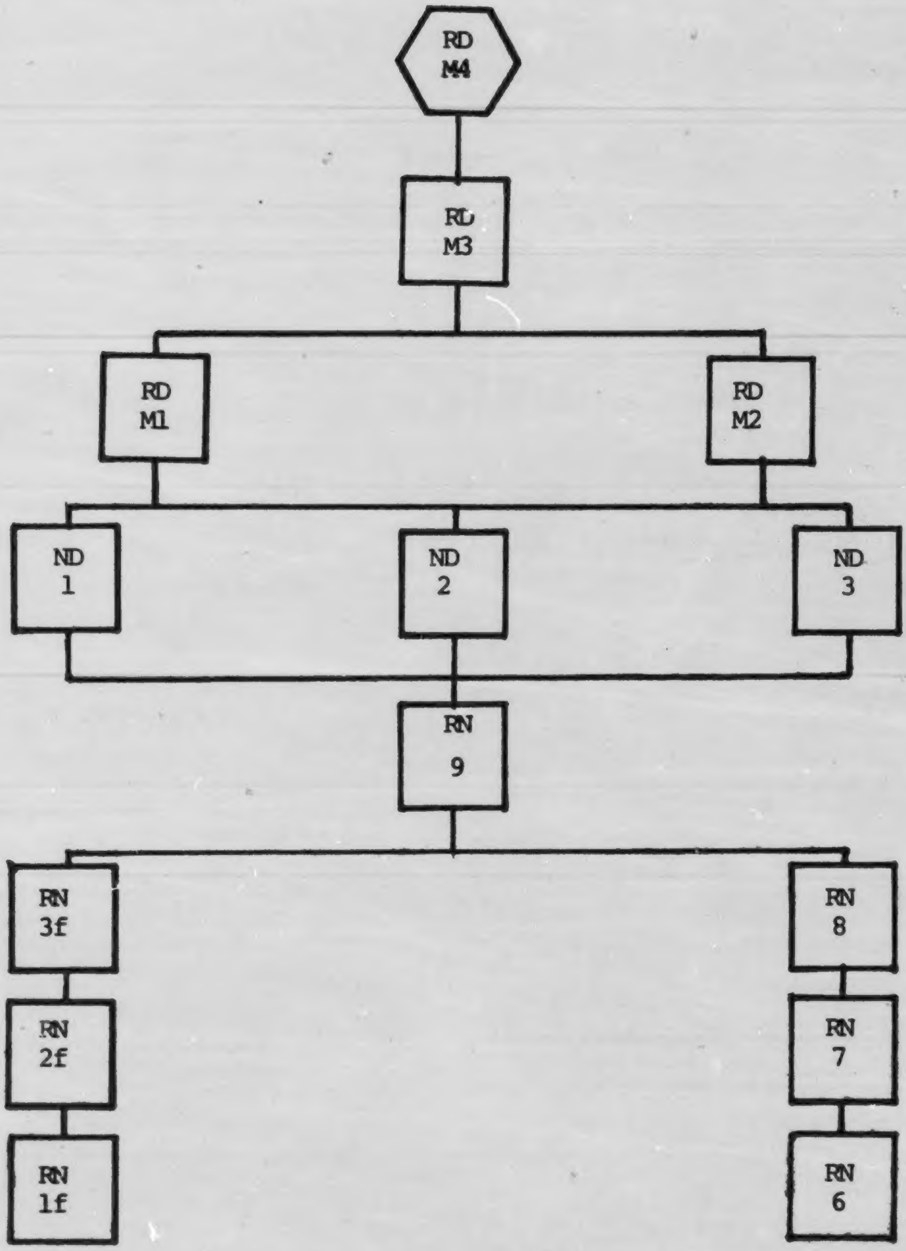
(RD-S)

With successful performance in eight out of ten attempts the student will be able to find the difference of:

		K	1	2	3	4	5	6
RD-S1.	A decimal fraction and a decimal fraction, with no regrouping. (Limit the decimal fractions to thousandths.)							X
RD-S2.	a. A decimal fraction and a mixed decimal number b. A decimal fraction and a whole number c. A mixed decimal number and a mixed decimal number. d. A mixed decimal number and a whole number.							X

RATIONAL NUMBERS - DECIMALS

MULTIPLICATION


RD M4
RD M3
RD M1
RD M2
ND 1
ND 2
ND 3
RN 9
RN 3f
RN 2f
RN 1f
RN 8
RN 7
RN 6

RATIONAL NUMBERS

DECIMALS - MULTIPLICATION

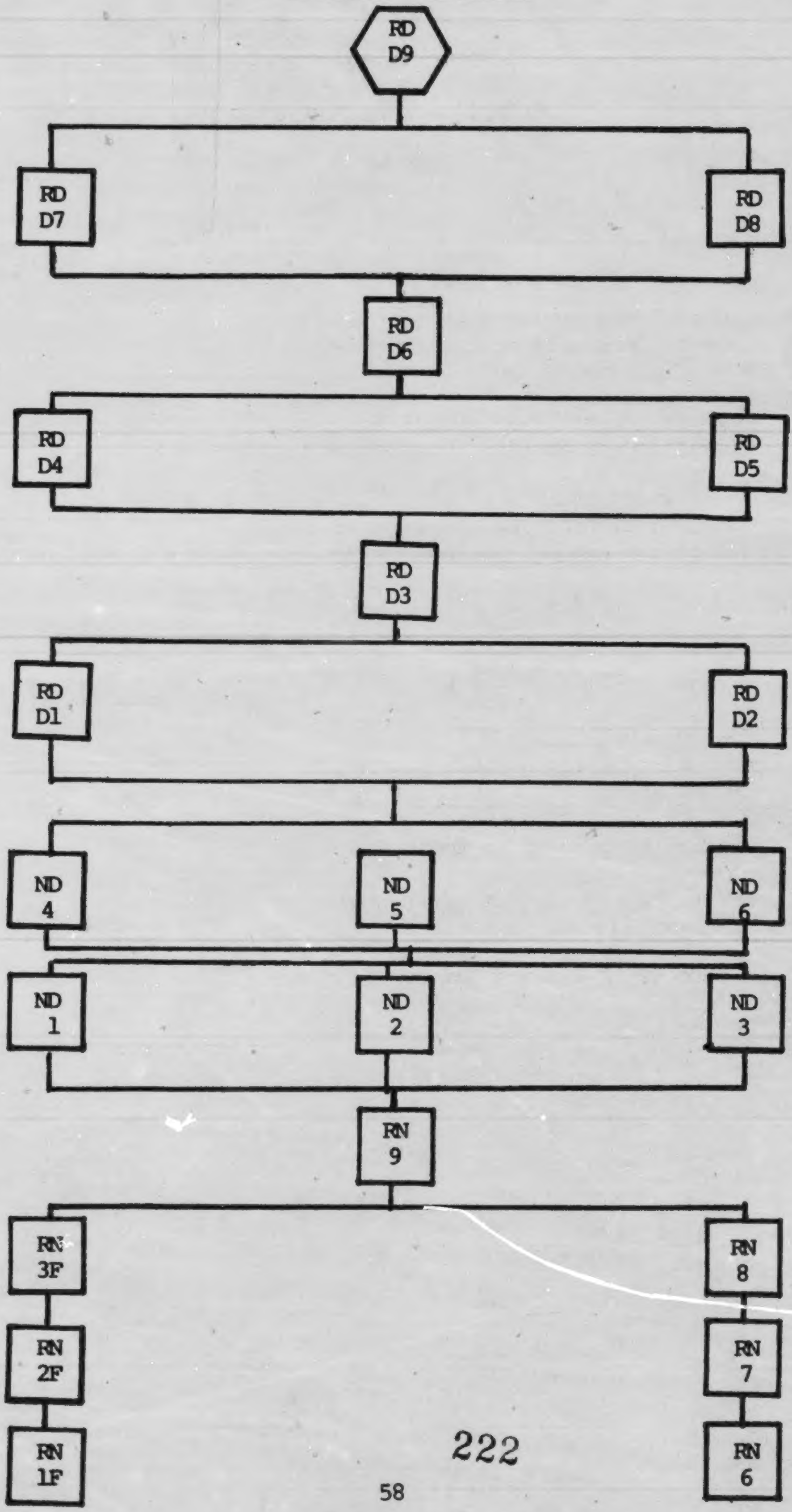
(RD-M)

With successful performance in eight out of ten attempts the student will be able to construct the product of:

		Pre-K, K	1	2	3	4	5	6
RD-M1.	A whole number by a decimal fraction. (Limit the product to thousandths.) (4 x .3) (5 x .003) (4 x .12)							X
RD-M2.	Two decimal fractions. (Limit the product to thousandths.) (.3 x .3) (.4 x .25) (.4 x .5)							X
RD-M3.	A mixed decimal number by: a. A whole number b. A mixed decimal number c. A decimal fraction. (Limit the product to thousandths.) (6 x 3.7) (.7 x 3.7) (3.7 x 3.7)							X
RD-M4.	A percent of a given number.							X

RATIONAL NUMBERS

DECIMALS - DIVISION


RD D9
RD D7
RD D8
RD D6
RD D4
RD D5
RD D3
RD D1
RD D2
ND 4
ND 5
ND 6
ND 1
ND 2
ND 3
RN 9
RN 3F
RN 8
RN 2F
RN 7
RN 1F
RN 6

RATIONAL NUMBERS - DECIMALS

DIVISION

(RD-D)

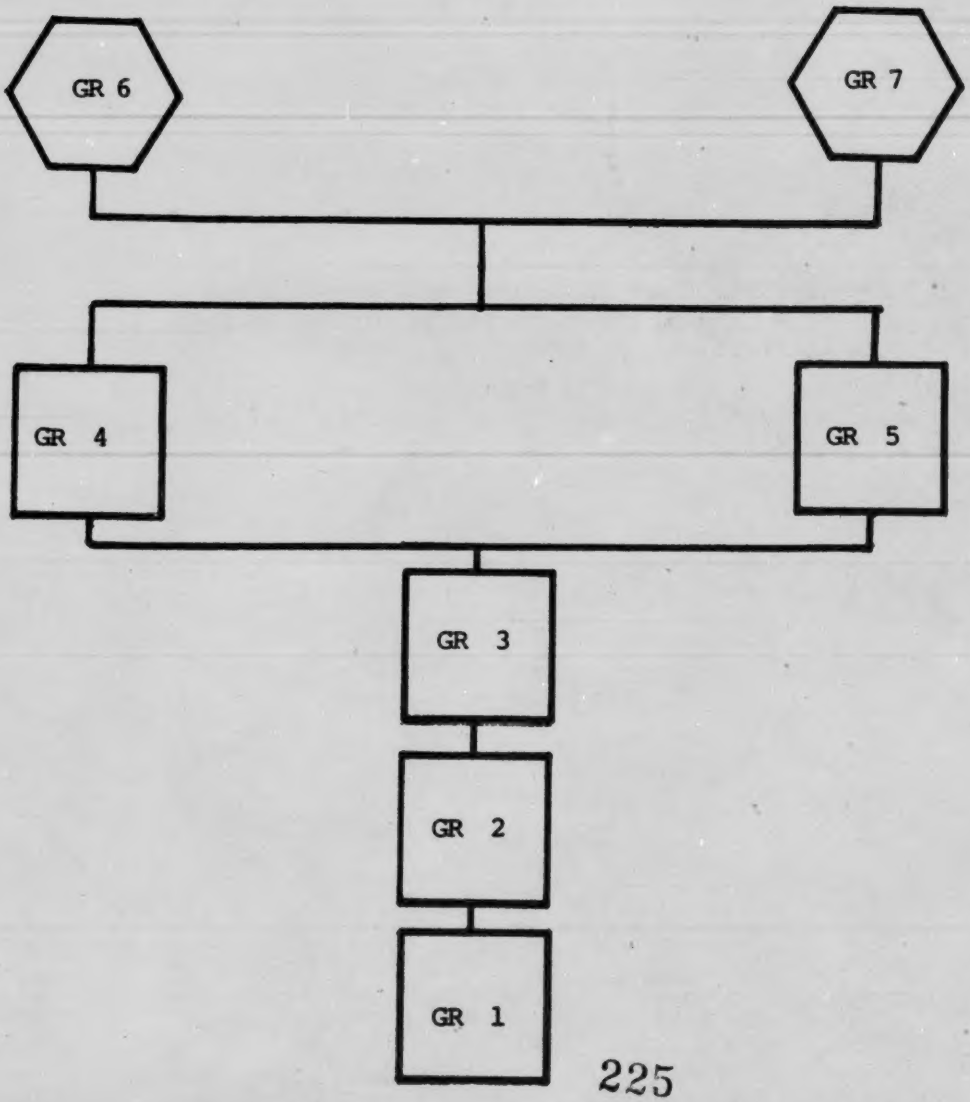
With successful performance in eight out of ten attempts the student will be able to find the quotient for:

		Pre-K, K	1	2	3	4	5	6
R-DD1.	A decimal fraction divided by a whole number. $2\overline{).8}$ $2\overline{).08}$ $2\overline{).80}$ $2\overline{).008}$ $2\overline{).800}$							X
R-DD2.	A mixed decimal fraction divided by a whole number. (Limit the dividend to the thousandths place.) $4\overline{)6.7}$ $3\overline{)8.0}$							X
R-DD3.	** Rename a whole number as a decimal fraction.							X
R-DD4.	** Divide to find the decimal equivalent of a common fraction when the value is less than one.							X
R-DD5.	** Write a common fraction as a percent. $\frac{3}{4} = 75\%$							X
R-DD6.	** Multiply decimal fractions; tenths, hundredths, or thousandths, by powers of ten. (Limit powers of ten to 10^4.) (10 x .3) (100 x .34) (1000 x .346) (10.000 x .346) - Readiness for division by a decimal fraction.							X
R-DD7.	A whole number divided by a decimal fraction. (Limit the divisor to hundredths.) $.2\overline{)7}$ $.02\overline{)8.0}$							X

		Pre-K, K	1	2	3	4	5	6
R-DD8.	A decimal fraction and a mixed decimal fraction divided by a decimal fraction. (Limit the divisor to hundredths.) $.2\overline{)\ .8}$ $.2\overline{)\ .08}$ $.02\overline{)\ 8.0}$ $.02\overline{)\ .08}$ $.2\overline{).26}$ $.02\overline{).26}$ $.2\overline{)1.\ 4}$ $.2\overline{)8.6}$ $.2\overline{)4.36}$							X
R-DD9.	A whole number, decimal fraction, or mixed decimal fraction divided by a mixed decimal fraction. (Limit the divisor to two digits.)							X

** Perform these operations as a prerequisite for finding the quotient for certain decimal numbers.

GEOMETRY READINESS


GR 6
GR 7
GR 4
GR 5
GR 3
GR 2
GR 1

225

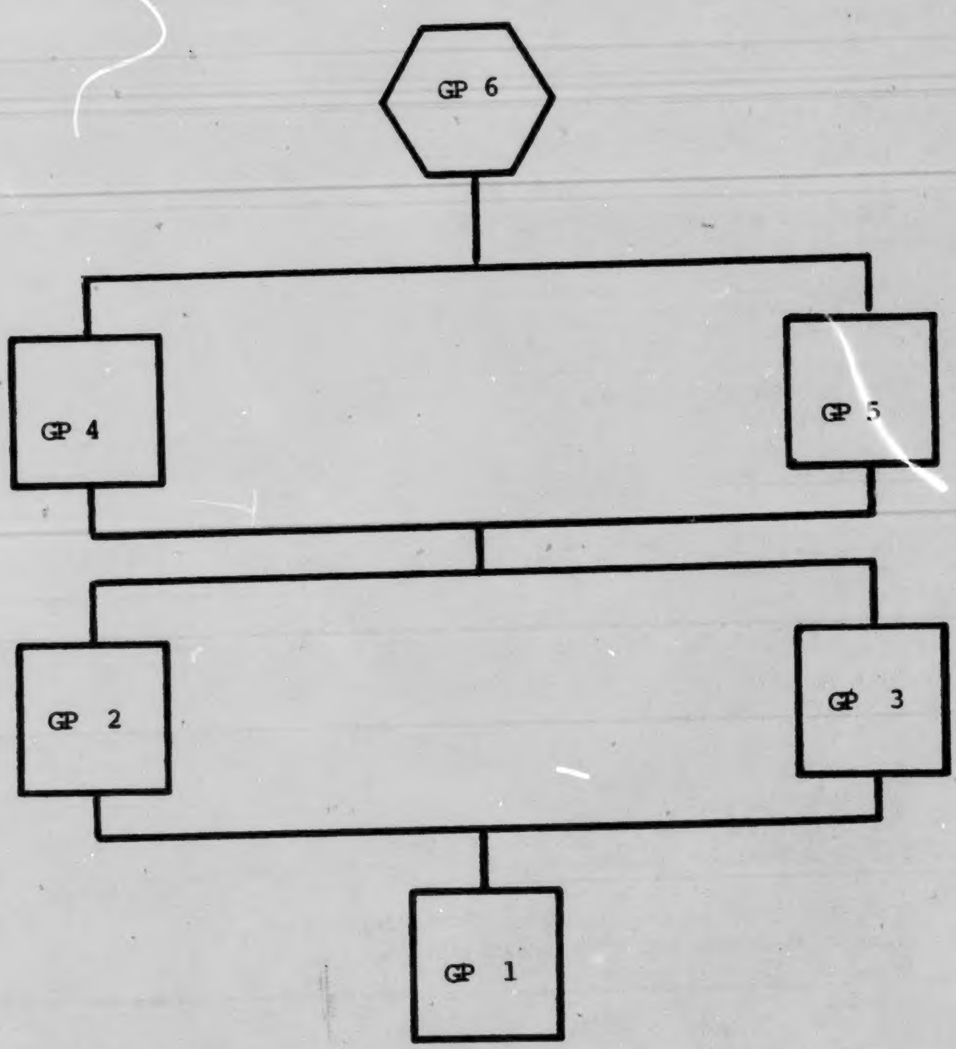
GEOMETRY - READINESS

(GR)

The student will be able to:

		Pre-K, K	1	2	3	4	5	6
GR-1.	Identify flat surfaces and rounded surfaces of a given set of objects. (balls, cans, boxes, etc.)	X	M					
GR-2.	Distinguish between flat and rounded surfaces of a rectangular prism, a cone, a sphere, and a cylinder. (Use physical models.)	X	M					
GR-3.	Sort a given set of objects according to their likenesses and differences. (shape)	X	M					
GR-4.	Identify physical models of geometric solids as: a. Cones b. Cubes c. Cylinders d. Rectangular prisms e. Spheres		X	M				
GR-5.	Identify physical models of: a. A circle b. A rectangle c. A square d. A triangle	X	M					
GR-6.	Sort a given set of physical models and classify them as: a. Cones b. Cubes c. Cylinders d. Rectangular prisms	X	M					
GR-7.	Sort a set of plane figures. Tell the number of sides and the number of corners in each plane figure.	X	M					

GEOMETRY PRIMARY

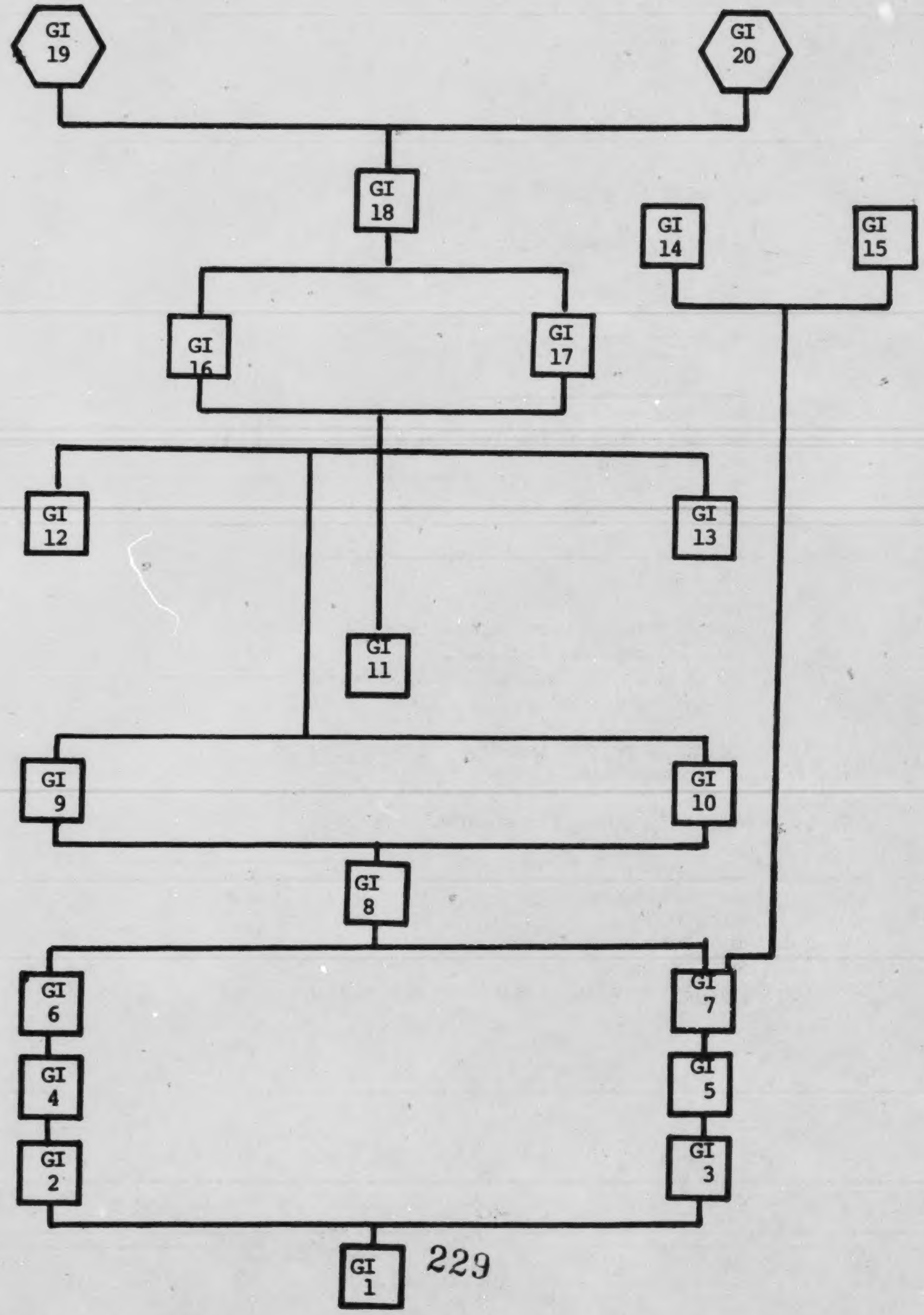

GP 6
GP 4
GP 5
GP 2
GP 3
GP 1

GEOMETRY - PRIMARY

(GP)

		Pre-K, K	1	2	3	4	5	6
The student will be able to:								
GP-1.	Identify closed curves	X	M					
GP-2.	Identify a circle.	X	M	______.				
GP-3.	Identify polygons.							
	a. Triangle	X	M	______.				
	b. Rectangle	X	M	______.				
	c. Square (special rectangle	X	M	______.				
	d. Pentagon			X	M			
	e. Hexagon			X	M			
	f. Octagon			X	M			
GP-4.	Name each shape in a given set of shapes in which:							
	a. Circles, triangle, rectangles and squares are included.	X						
	b. Pentagons, hexagons and octagons are included.			X	M			
GP-5.	Identify points inside, outside, and on a closed curve.		X	M	___.			
GP-6.	Identify geometric solids.							
	a. Sphere	X	M	_____.				
	b. Cylinder	X	M	_____.				
	c. Cone	X	M	_____.				
	d. Cube				X			
	e. Prism				X			
	f. Pyramid (in real life situation)				X			

GEOMETRY INTERMEDIATE


GI 19
GI 20
GI 18
GI 14
GI 15
GI 16
GI 17
GI 12
GI 13
GI 11
GI 9
GI 10
GI 8
GI 6
GI 7
GI 4
GI 5
GI 2
GI 3
GI 1

229

GEOMETRY - INTERMEDIATE

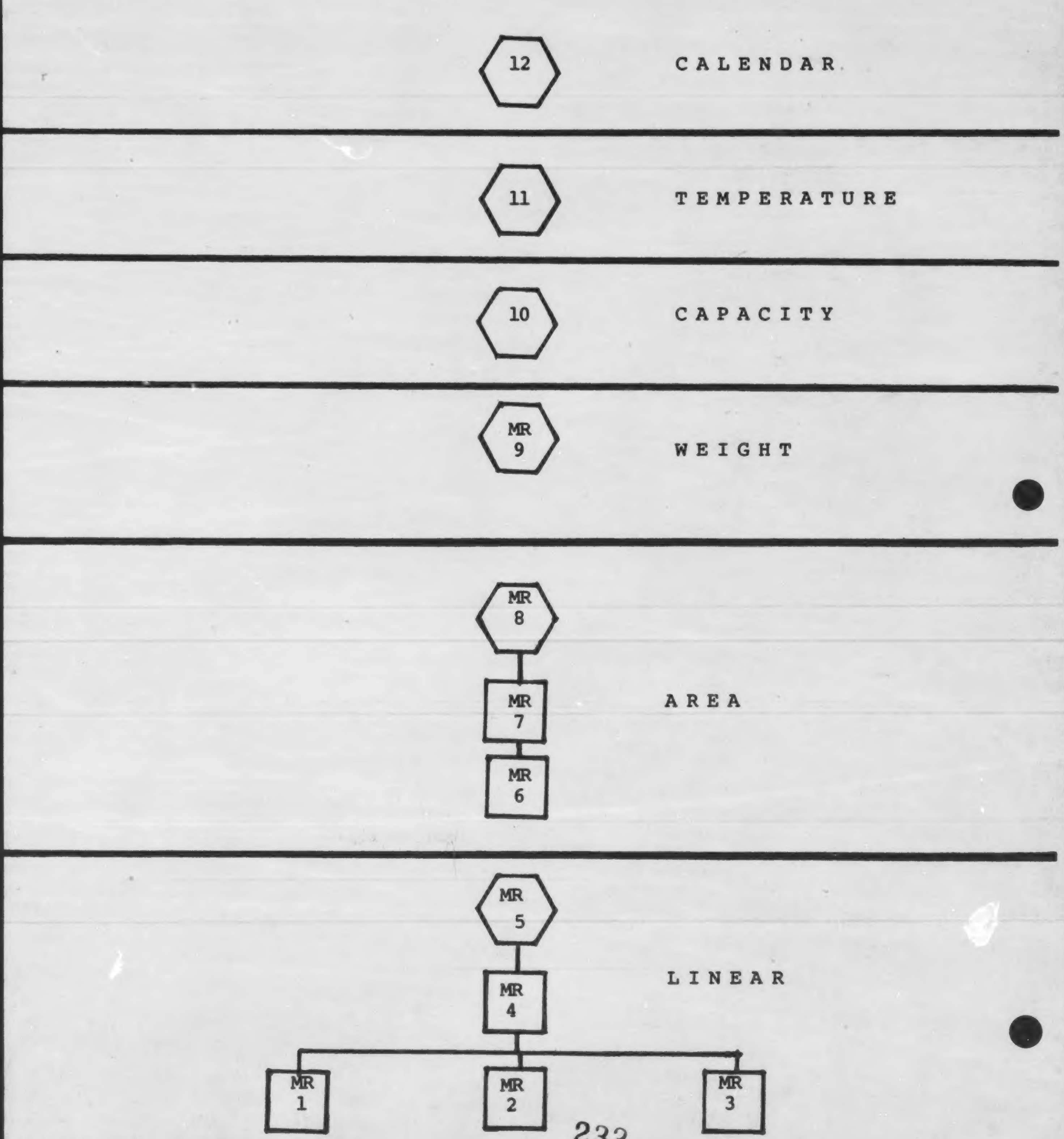
(GI)

	The student will be able to:	Pre-K, K	1	2	3	4	5	6
GI-1.	Identify and draw a model of: a. A point b. A line c. A line gegment d. A ray e. An angle					X	M	___.
GI-2.	Identify and draw models of lines and line segments. a. Horizontal b. Vertical c. Oblique					X	M	___.
GI-3.	Describe angles as right, obtuse, or acute.						X	M
GI-4.	Identify and draw models of: a. perpendicular lines b. intersecting lines c. parallel lines					X	M	___.
GI-5.	Measure angles in degrees using a protractor.						X	M
GI-6.	Identify and name the symbol for: a. Line b. Line segment c. Ray d. Angle					X	X	X
GI-7.	Identify and draw a model of a simple closed curve and the region of a simple closed curve.					X	X	X
GI-8.	Identify a polygon as a simple closed curve formed by line segments.					X	X	X

		Pre-K, K	1	2	3	4	5	6
GI-9.	Identify and name polygons and their regions having eight or fewer sides.					X	M___.	
GI-10.	Distinguish between polygons that are regular and polygons that are not regular.					X	M___.	
GI-11.	Identify these quadrilaterals.							
	a. Rectangle							
	b. Square							
	c. Parallelogram						X	M
GI-12.	Identify and draw models of the line(s) of symmetry of polygons.					X	M____.	
GI-13.	Identify congruent polygons.							X
GI-14.	Name and identify terms related to circles:							
	a. Arc							
	b. Chord							
	c. Center							
	d. Radius							
	e. Diameter							
	f. Circumference							
	g. Semi-circle						X	M

		Pre-K, K	1	2	3	4	5	6
GI-15.	Identify concentric circles.						X	M
GI-16.	Find the sum of the angles in a triangle.						X	M
GI-17.	Identify triangles as right, obtuse or acute.							X
GI-18.	Identify triangles as equilateral, isosceles, or scalene.							X
GI-19.	Classify prisms as: a. Triangular b. Square c. Pentagonal d. Cube e. Hexagonal f. Octagonal							X
GI-20.	Classify pyramids as: a. Triangular b. Square c. Pentagonal d. Hexagonal							X

MEASUREMENT READINESS


12
CALENDAR
11
TEMPERATURE
10
CAPACITY
MR 9
WEIGHT
MR 8
MR 7
MR 6
AREA
MR 5
MR 4
LINEAR
MR 1
MR 2
MR 3

MEASUREMENT - READINESS

(MR)

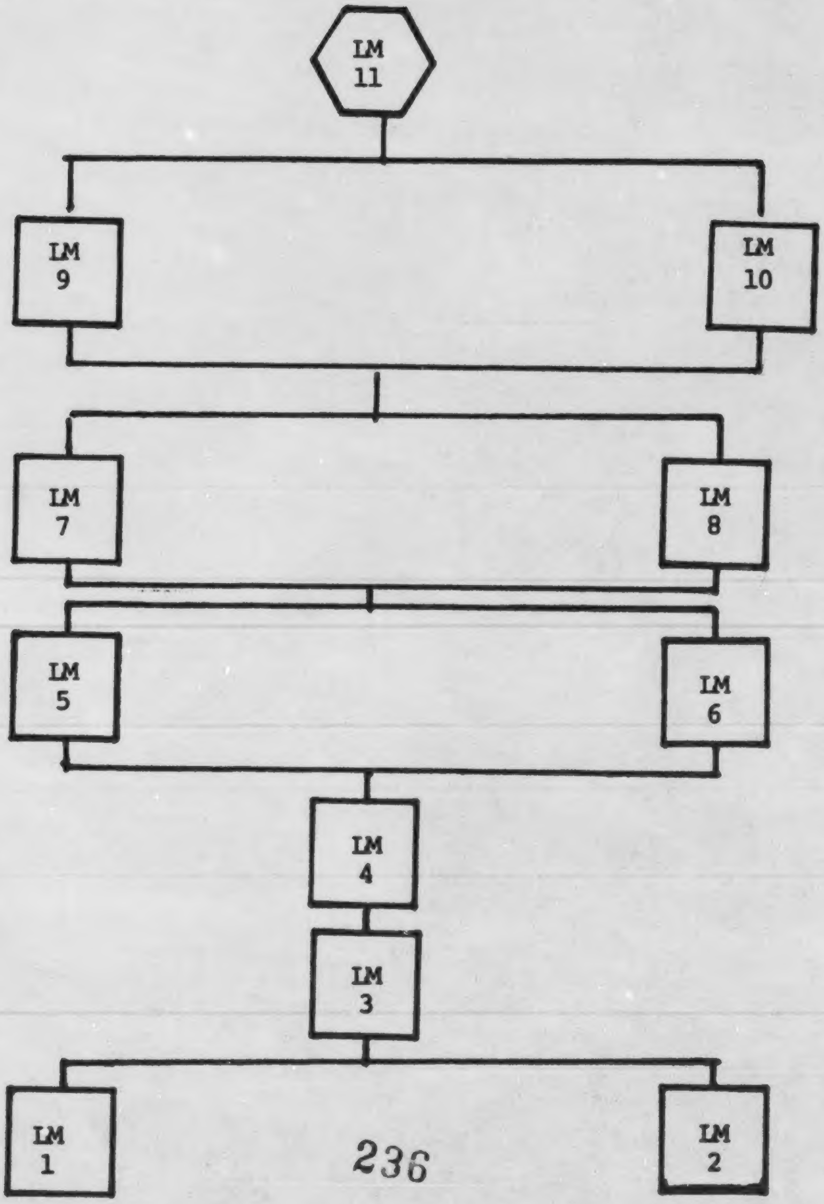
The student will be able to:

		Pre-K, K	1	2	3	4	5	6
MR-1.	Compare sizes of objects. (Wide, not as wide), (big, little), (tall, short), (small, large)	X	M	————————				
MR-2.	Compare lengths of objects. (longer, shorter)	X	M	X	X	X	X	X
MR-3.	Compare lengths of two objects to determine which is longer and which is shorter.	X	M	X	X	X	X	X
MR-4.	Order the lengths of three objects to determine which is longest and which is shortest.	X						
MR-5.	Measure the length of objects using non-standard units. e. g. (hand, span, foot, stride, string, pencil, paper clip, etc.)	X	M	X	X	X	X	X
MR-6.	Compare two regions to decide which is larger and which is smaller. (two circular regions), (Two square regions)	X	M	X	X	X	X	X
MR-7.	Order three regions to decide which is largest and which is smallest. (Three circular regions.)	X	M	X	X	X	X	X
MR-8.	Measure the area of objects using non-standard unit regions.	X	M	————————				
MR-9.	Compare weights of objects to determine which is: a. Heavier b. Lighter	X	M	————————				
MR-10.	Compare the capacity of two containers using liquid, sand, and solids.	X	M	————————				
MR-11.	Compare weather temperatures (hot-cold, cool-warm), and temperatures of filled containers (as hot as, as cold as, etc.)	X	M	————————				

		Pre-K, K	1	2	3	4	5	6
MR-12.	Identify the calendar as a device for use in keeping a record of time: (a week from today, this month, next month, today, twelve days from today, etc.)	X	M	———				

MEASUREMENT LINEAR

METRIC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LM 2

236

MEASUREMENT - METRIC - LINEAR

(MM-L)

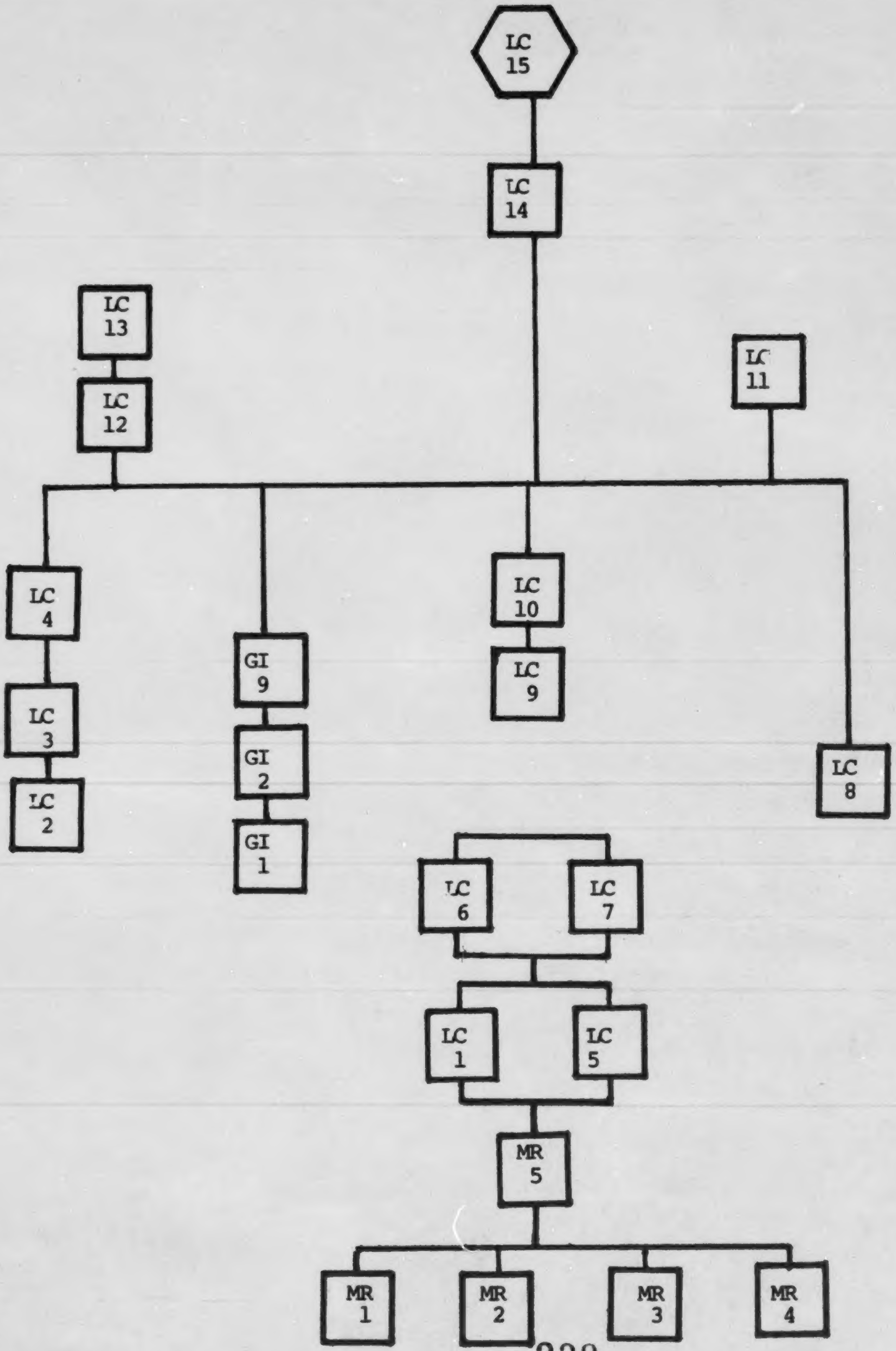
The student will be able to:

		Pre-K, K	1	2	3	4	5	6
MM-L1.	Name orally the centimeter as a standard unit used to measure length write (record) the symbol for centimeter (cm),and record the length of an object in centimeters; and a line segment.		X	M	—	—	—	—
MM-L2.	Name the meter as a standard unit to measure length, write the symbol for meter (m), and name objects that can be measured in meters.		X	M	—	—	—	—
MM-L3.	Name and record the number of centimeters in a meter and convert a measurement given in centimeters to meters.			M	—	—	—	—
MM-L4.	Convert a measurement given in meters (limit to whole numbers) to centimeters. (Limit number of meters one through nine)				X	M	—	
MM-L5.	Convert a measurement given in centimeters to meters. 153 cm = 1.53 m				X	M	—	
MM-L6.	Convert a measurement given in meters to centimeters. 0.5 m = 50 cm 5 m =500 cm 5.1 m = 510 cm						X	M
MM-L7.	Name the millimeter as a standard unit used to measure and record the length of an object or line segment.				X	M	—	—
MM-L8.	Name the kilometer as a standard unit to measure length, write the symbol for kilometer (km), and name the number of meters in a kilometer.				X	M	—	—
MM-L10.	Name the number of millimeters in a meter and convert a measurement given in meters to millimeters. (Limit number of meters one through nine)							

237

		Pre-K, K	1	2	3	4	5	6
MM-L11.	Choose appropriate unit and record the measurement, when given a situation where length is to be found.						X	M

MEASUREMENT LINEAR (CUSTOMARY)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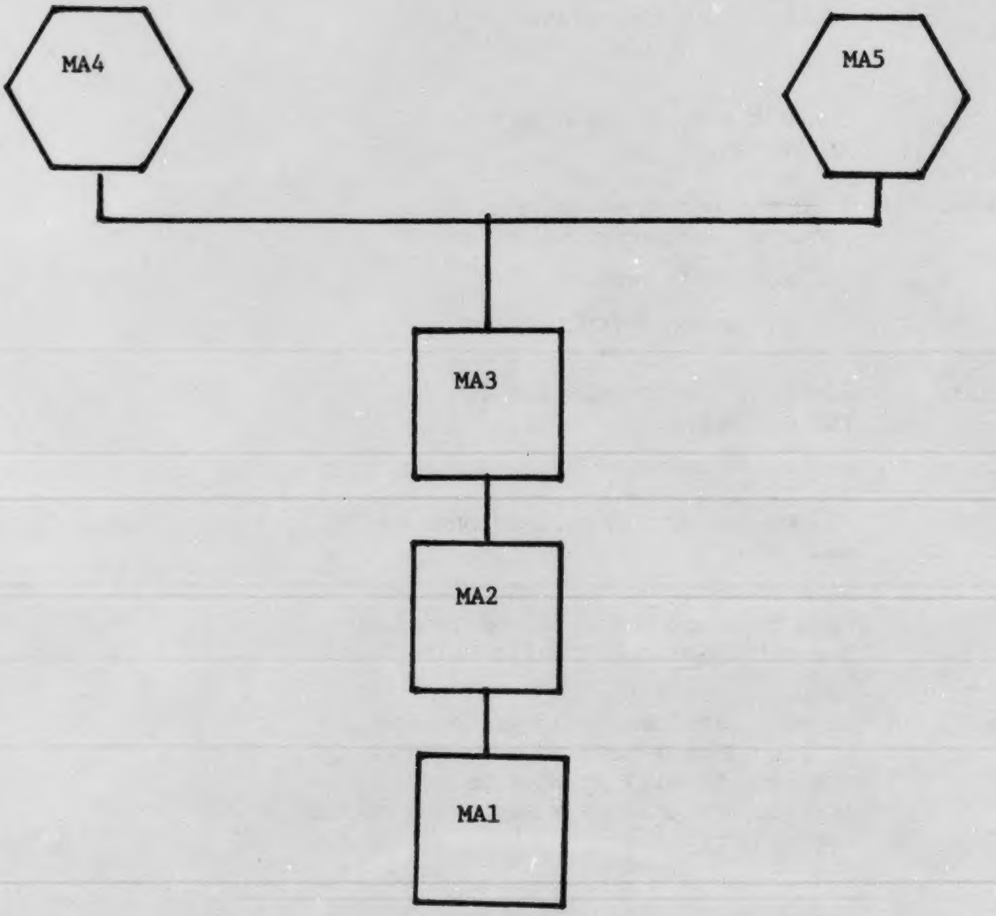
GI 2
GI 1
LC 10
LC 9
LC 8
LC 6
LC 7
LC 1
LC 5
MR 5
MR 1
MR 2
MR 3
MR 4

MEASUREMENT LINEAR (CUSTOMARY)
(MLC)

		Pre-K, K	1	2	3	4	5	6
	Given a model of:							
MLC-1.	An inch, the student will be able to name an inch as a standard unit used to: a. measure length . b. measure and record the length of an object in inches. c. measure and record the length of a line segment in inches.		X	M	____________			.
MLC-2.	A half inch, the student will be able to measure and record the length of an object to the nearest half inch.				X	M	_______	.
MLC-3.	A quarter of an inch, the student will be able to measure and record the length of an object to the nearest quarter inch.					X	M	___.
MLC-4.	An eighth of an inch,the student will be able to measure and record the length of an object to the nearest eighth inch.						X	M
MLC-5.	A foot, the student will be able to name the foot as a standard unit used to measure length and name the number of inches in a foot.		X	M	____________			.
	The student will be able to:							
MLC-6.	Convert a measurement given in feet to inches.				X	M	_______	.
MLC-7.	Convert a measurement given in inches to feet; to feet and inches.							
MLC-8.	Identify the symbol for inch/inches (") and for foot/feet ('); the abbreviation for inch/inches (in.), and for foot/feet (ft).				X	M	_______	.

		Pre-K, K	1	2	3	4	5	6
MLC-9.	Given a model of a yard the student will be able to: a. name the yard as a standard unit used to measure length b. identify the abbreviation for yard (yd.).		X	M	____	____	____	____.
	The student will be able to:							
MLC-10.	a. name the number of feet in a yard. b. name the number of inches in a yard.				X	M	____	____.
MLC-11.	Convert a fractional part of a yard to inches.					X	M	____.
MLC-12.	Find the perimeter of a polygon (square, rectangle,and triangle).							
	a. whole numbers			X	M	____	____	____.
	b. mixed denominations						X	M.
MLC-13.	Identify the formula for finding the perimeter of: a. a rectangle (2l + 2w) b. a square (4 s) c. an equilateral triangle (3 s)					X	M	____.
MLC-14.	Name the mile as a standard unit used to measure length and identify the abbreviation for mile/miles (mi.).				X	M	____	____.
MLC-15.	Given a problem solving situation involving linear measurement (customary), the student will be able to use the appropriate unit of measure and record the measurement.		X	M	____	____	____	____.

MEASUREMENT METRIC AREA


MA4
MA5
MA3
MA2
MA1

242

MEASUREMENT - AREA (METRIC)

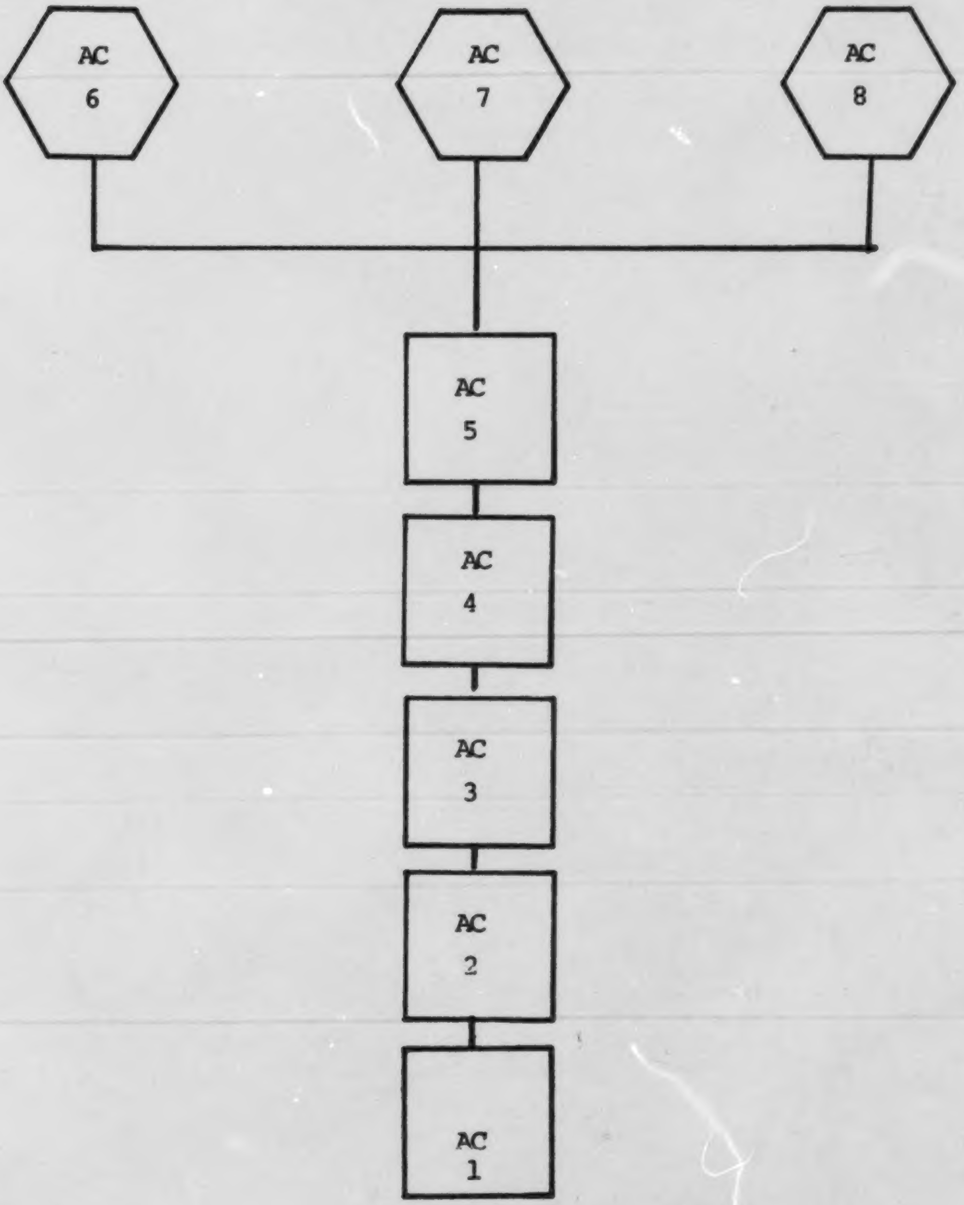
(M-AM)

		Pre-K, K	1	2	3	4	5	6
M-AM1.	Given a model of a square region one centimeter by one centimeter, the student will be able to: a. Name (orally) the standard unit of area measurement the model represents. [square centimeter] b. Read (orally) the symbol "cm^2." [square centimeter]				X	M	——	
M-AM2.	Given cm^2 models the student will be able to: a. Measure the area of various surfaces (small surface, rectangular in shape). b. Record the number of cm^2 in the measurement.				X	M	——	
M-AM3.	The student will be able to: a. Name the standard unit of area measurement whose model is a square region one meter by one meter. [square meter] b. Write the symbol for "square meter". [M^2] c. Read the symbol "m^2" orally. [square meter]				X	M	——	
M-AM4.	a. Apply an appropriate rule to find the area of a rectangular region whose dimensions are given in meter: [A = l x w] For rectangles that are square: [A = s x s or A = s^2 or A = l x w] b. Record the measurement.						X	M

			Pre-K, K	1	2	3	4	5	6
M-AM5.	a.	Name the standard square unit of measurement that is one kilometer by one kilometer. [square kilometer]							
	b.	Write the symbol for "square centimeter." [km^2]							
	c.	Read orally the symbol "km^2." [square kilometer]							
	d.	Apply an appropriate rule to find the area of rectangular regions whose dimensions are given in kilometers.						X	M

MEASUREMENT - CUSTOMARY

AREA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AC 5
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AC 3
AC 2
AC 1

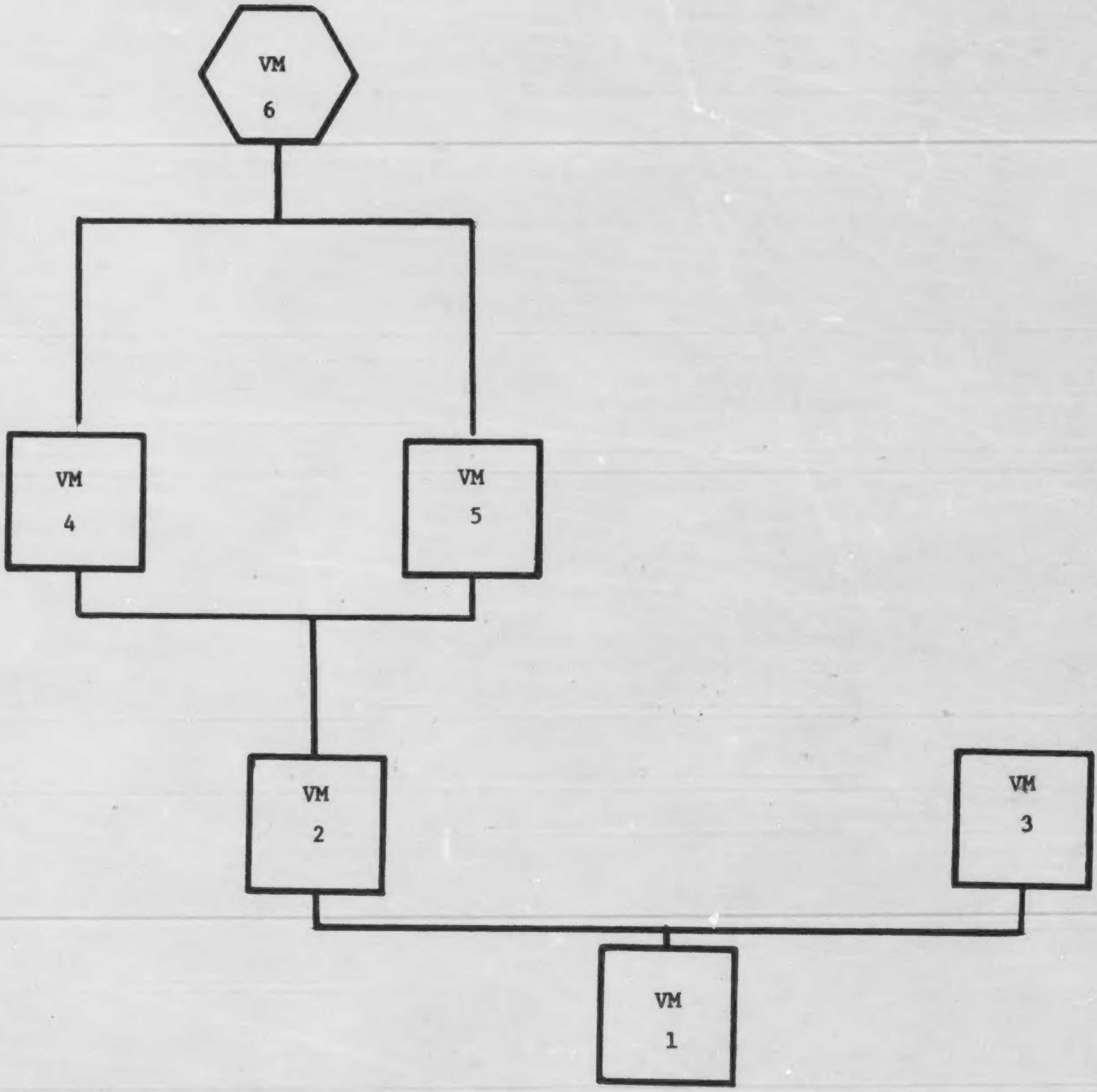
MEASUREMENT - AREA (CUSTOMARY)

(MA-C)

		Pre-K, K	1	2	3	4	5	6
M-AC1.	Given a model of a square region one inch by one inch, the student will be able to:							
	a. Name (orally) the standard unit of area measurement the model represents. [square inch]							
	b. Write the abbreviation for "square inch(es). [sq. in]				X	M—	—	—
M-AC2.	Given inch-square models the student will be able to measure the surface of various objects (small surface, rectangular in shape) and record the measurement.				X	M—	—	—
M-AC3.	Given foot-square models, the student will be able to:							
	a. Name the standard unit of area measurement whose model is a square region one foot by one foot. [square foot]					X	M—	—
	b. Measure the surface of various objects (rectangular in shape; not too small) and record the measurement.					X	M—	—
	c. Write the abbreviation for square foot/feet. [sq. ft.]					X	M—	—
M-AC4.	The student will be able to:							
	a. Name the standard unit of area measurement whose model is a square region one yard by one yard. [square yard]					X	M—	—
	b. Apply an appropriate rule to find the area of a rectangular region whose dimensions are given in yards, and record the measurement.					X	M—	—
M-AC5.	a. Name the standard square unit of area measurement that is one mile by one mile. [square mile]							

			Pre-K, K	1	2	3	4	5	6
	b.	Write the abbreviation for "square mile(s)." [sq. mi.]						X	M
	c.	Apply an appropriate rule to find the area of a rectangular region whose dimensions are given in miles, and record the measurement.						X	M
M-AC6.	a.	Describe the acre. [A standard unit, not necessarily square or any other specified shape, used in the measurement of land area]							X
	b.	Compare the size of an acre (much larger, much smaller) with the size of a square foot, a square yard, and a square mile, when given an equivalence chart.							X
M-AC7.	a.	Name the number of square inches in a square foot.							X
	b.	Convert a measurement given in square feet [limit: two sq. ft.] to square inches.							X
M-AC8.	a.	Name the number of square feet in a square yard.							X
	b.	Convert a measurement given in square yards, to square feet.							X
	c.	Convert a measurement given in a whole number of square feet, to square yards; to square yards and square feet.							X

MEASUREMENT - VOLUME (CAPACITY) METRIC


VM
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VM
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VM
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VM
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VM
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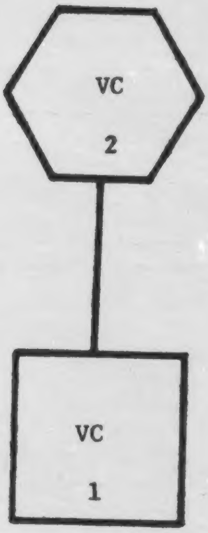
VM
1

MEASUREMENT - VOLUME (CAPACITY) METRIC

(M-VM)

		Pre-K, K	1	2	3	4	5	6
M-VM1.	Given a model of liter and milliliter, the student will be able to:							
	a. Name the standard unit of liquid capacity the model represents.		X	M	____________.			
	b. Write the symbol for liter and milliliter. [l, ml]		X	M	____________.			
M-VM2.	The student will be able to name the number of milliliteric in a liter, then convert a measure given in milliliters (four-digit multiples of a thousand) to liters.					X	M	___.
M-VM3.	Given a model of a cubic centimeter, the student will be able to:							
	a. Name the standard unit for measuring volume.						X	M
	b. Write the symbol for cubic centimeter(s). [cm^3]						X	M
	c. Find the volume of rectangular prisms in cubic centimeters.						X	M
M-VM4.	The student will be able to:							
	a. Convert a measure given in milliliters to liters.						X	M
	b. Convert a measure given in liters to milliliters.						X	M
M-VM5.	Given a problem solving situation for measuring the capacity of a specified container, the student will be able to choose the appropriate unit of measure and solve the problem.						X	M

MEASUREMENT VOLUME CUSTOMARY



250

MEASUREMENT - VOLUME (CUSTOMARY)

(MVC)

		Pre-K, K	1	2	3	4	5	6
MV-C1.	Given a model of a cubic inch, the student will be able to:							
	a. Name the standard unit of volume measurement the model represents. [cubic inch]						X	M
	b. Write the abbreviation for cubic inch. [cu. in.]						X	M
	c. Find the volume of rectangular prisms in cubic inches.						X	M
MV-C2.	a. Name the standard unit of volume measurement whose model is:							
	(1) One foot by one foot by one foot. [cubic foot]						X	M
	(2) One yard by one yard by one yard. [cubic yard]						X	M
	b. Write the abbreviation for: (1) Cubic foot/feet (cu. ft.) (2) Cubic yard/s (cu. yd.)							
	c. Measure a rectangular prism in cubic feet and cubic yards, when given specified dimensions.						X	M

MEASUREMENT - (CUSTOMARY) LIQUID

(M-CL)

			Pre-K, K	1	2	3	4	5	6
M-CL1.		Given a model of a cup, the student will be able to:							
	a.	Name the cup as a standard unit measure liquid capacity.			X	M	________.		
	b.	Write the abbreviation for cup(s). [c.]			X	M	________.		
	c.	Estimate and measure the capacity of varied containers in cups.			X	M	________.		
M-CL2.		Given a model of a pint, the student will be able to:							
	a.	Name the pint as a standard unit used to measure liquid capacity.		X	M	____________.			
	b.	Write the abbreviation for pint(s). [pt.]		X	M	____________.			
	c.	Estimate and measure the capacity of varied containers in pints.		X	M	____________.			
		The student will be able to:							
M-CL3.	a.	Name the number of cups in a pint.			X	M	__________.		
	b.	Convert a measurement given in cups to pints. (Limit number of cups to 2,4,6,8,...,18)			X	M	________.		
M-CL4.		Convert a measure given in pints to cups.			X	M	________.		
M-CL5.		Convert a measure given in cups to pints. (limit number of cups to 20.)			X	M	________.		
M-CL6.		Given a model of a quart, the student will be able to:							
	a.	Name the quart as a standard unit used to measure liquid capacity.		X	M	____________.			

		Pre-K, K	1	2	3	4	5	6
	b. Write the abbreviation for quart. [qt.]		X	M	———	———	———	———
	c. Estimate and measure the capacity of varied containers in quarts.		X	M	———	———	———	———
	The student will be able to:							
M-CL7.	a. Name the number of pints in a quart.				X	———	———	———
	b. Convert a measurement given in pints to quarts. (Limit number of pints to 2, 4, 6, 8,..., 18)				X	———	———	———
M-CL8.	Convert a measurement given in quarts to pints.				X	———	———	———
M-CL9.	Convert a measurement given in pints to quarts. (Limit number of pints to 20)				X	———	———	———
M-CL10.	Given a model of a gallon, the student will be able to:							
	a. Name the gallon as a standard unit used to measure liquid capacity.		X	M	———	———	———	———
	b. Write the abbreviation for gallon. [gal]		X	M	———	———	———	———
	c. Name the number of quarts in a gallon.		X	M	———	———	———	———
	d. Convert quarts to gallons. (Limit number of quarts to 4, 8, 16, 20)		X	M	———	———	———	———
M-CL11.	The student will be able to convert a measurement given in gallons to quarts.		C	M	———	———	———	———
M-CL12.	Given a model of a fluid ounce, the student will be able to:							
	a. Name the fluid ounce as a standard unit used to measure liquid capacity.						X	M
	b. Write the abbreviation for fluid ounce. [fl. oz.]						X	M

		Pre-K, K	1	2	3	4	5	6
	c. Name the number of fluid ounces in a cup.						X	M
	d. Convert ounces to cups.						X	M
M-CL13.	Given a problem solving situation in which capacity is implied, rather than explicitly stated, the student will be able to:							
	a. Determine an appropriate unit to use.					X	M	___.
	b. Apply an appropriate formula.					X	M	___.
	c. Solve the problem.							
	d. Record the solution, using correct abbreviations.					X	M	___.

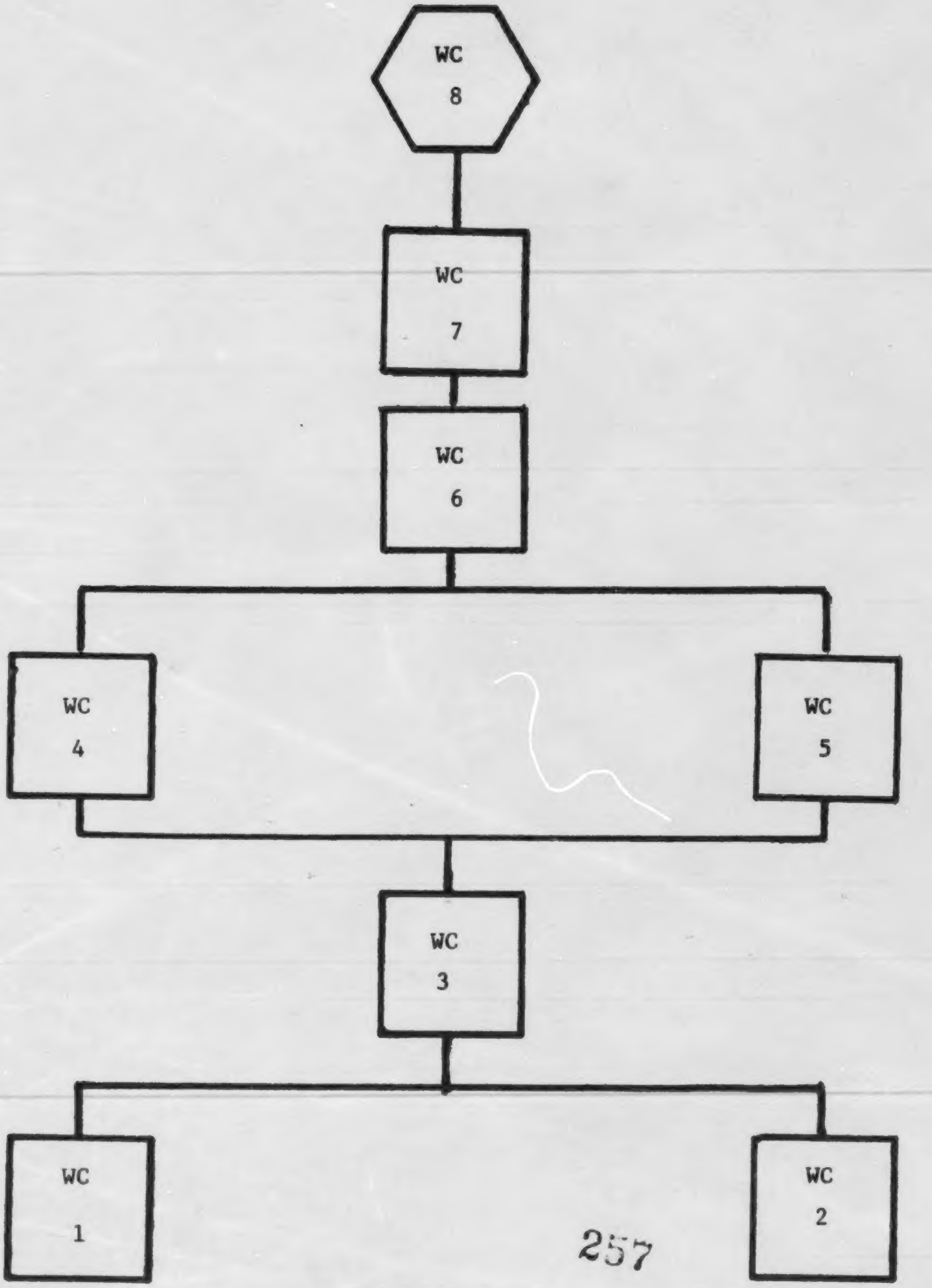
MEASUREMENT - MASS (METRIC)

(M-MM)

		Pre-K, K	1	2	3	4	5	6
M-MM1.	Given a model of a gram, the student will be able to:							
	a. Name the gram as a standard unit for measuring mass.				X	M	___	___.
	b. Write the symbol for gram. [g]				X	M	___	___.
	c. Measure and record the mass of an object.					X	M	___.
M-MM2.	Given a model of a kilogram, the student will be able to:							
	a. Name the kilogram as a standard unit for measuring mass.		X	M	___	___	___	___.
	b. Write the symbol for kilogram. [kg.]		X	M	___	___	___	___.
	c. Measure and record the mass of an object/person in kilograms.				X	M	___	___.
	The student will be able to:							
M-MM3.	a. Name the number of grams in a kilogram.				X	M	___	___.
	b. Convert a measurement given in grams (four digit multiples of a thousand) to kilograms.				X	M	___	___.
M-MM4.	Convert a measurement given in grams to kilograms.				X	M	___	___.
M-MM5.	Convert a measurement given in kilograms to grams.				X	M	___	___.
M-MM6.	a. Name the metric ton as a standard unit for measuring mass.							
	b. Write the symblol for metric ton. [t]							
	c. Name things that are measured in metric tons.							

		Pre-K, K	1	2	3	4	5	6
M-MM7.	Given a problem measurement solving situation in which the type measurement mass is implied, rather than explicitly stated, the student will be able to:							
	a. Determine an appropriate unit to use.		X	M	____________.			
	b. Apply an appropriate formula.				X	M	_____.	
	c. Solve the problem.		X	M	____________.			
	d. Record the solution using correct symbols for the unit involved.		X	M	____________.			

MEASUREMENT - WEIGHT (DRY) CUSTOMARY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WC 1
WC 2

257

MEASUREMENT - WEIGHT (CUSTOMARY)

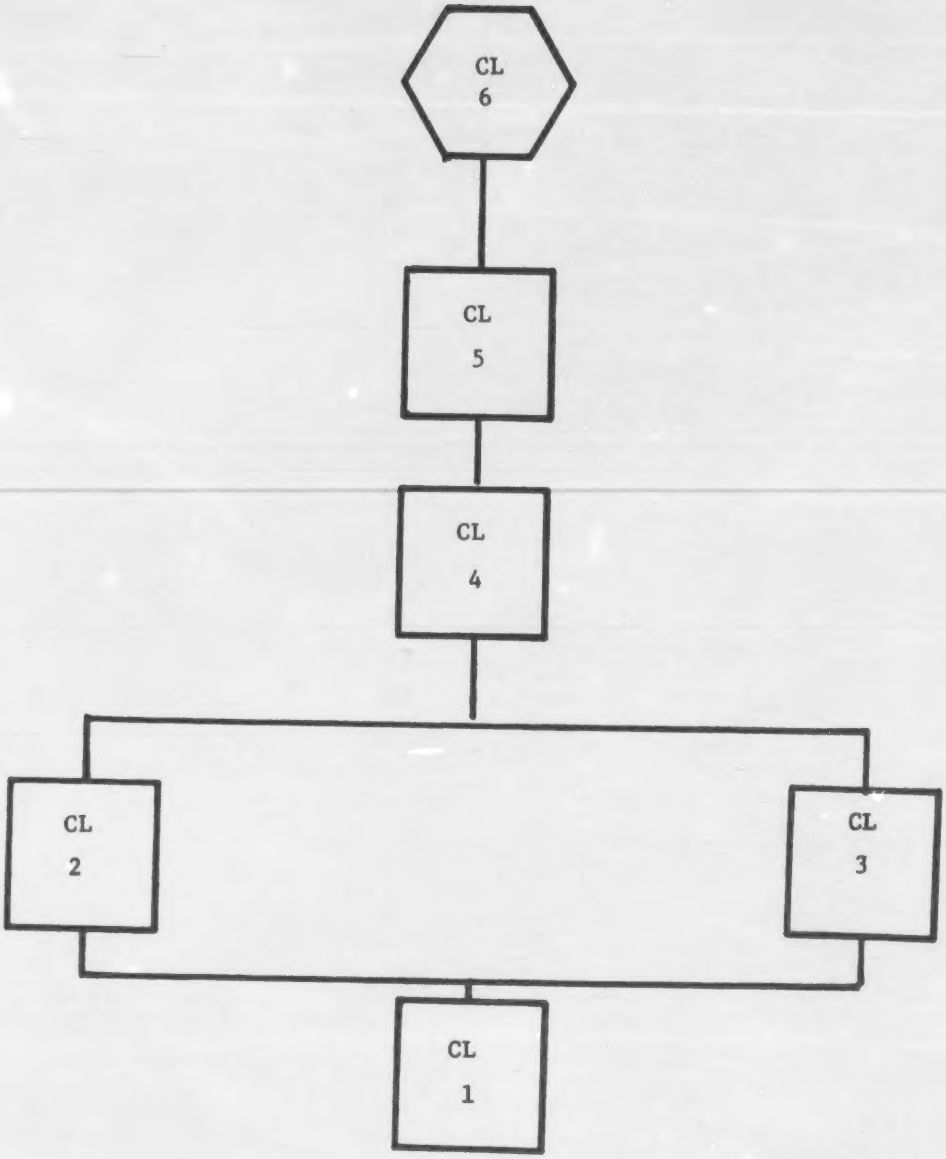
(MW-CD)

		Pre-K, K	1	2	3	4	5	6
MW-CD1.	Given a model of a pound as a standard unit used to measure weight, the student will be able to:							
	a. Name the pound as a standard unit used to measure weight.		X	M	______.			
	b. Write the abbreviation for pound. [lb.]		X	______.				
	c. Weigh an object in pounds.		X	______.				
MW-CD2.	Given a model of an ounce as a standard unit used to measure weight, the student will be able to:							
	a. Name the ounce as a standard unit to measure weight.			X	M	______.		
	b. Write the abbreviation for ounce. [oz.]				X	M	______.	
	c. Weigh an object in ounces and record the weight.					X	M	__.
MW-CD3.	The student will be able to:							
	a. Name the number of ounces in a pound.				X	M	______.	
	b. Convert a measurement given in pounds (limit number of pounds to 1, 2, 3,..., 9) to ounces.						X	M
MW-CD4	Convert a measurement given in ounces to pounds or to pounds and ounces. (Limit number of ounces to 16 ounces or greater but less than 100 ounces.)						X	M
MW-CD5	Convert a fractional part of a pound to ounces. (quarters, halves)					X	M	___.
MW-CD6	Convert a measurement given in pounds to ounces (Limit number of pounds to 1, 1¼, 1½, 1-3/4, 2, 2-1/4, 2½, 2-3/4,...9.)					X	M	___.
MW-CD7	a. Name the ton as a standard unit used to measure weight.				X	M	_____.	
	b. Write the abbreviation for ton [tn]				X	M	_____.	
	c. Name things that are measured in tons.				X	________.		

MW-CD8. Given a problem solving (measurement) situation in which the type of measurement weight is implied rather than explicitly stated, the student will be able to:

	Pre-K, K	1	2	3	4	5	6
a. Determine the appropriate unit to use.		X	____	____			.
b. Solve the problem		X	M	____			.
c. Record the solution using correct abbreviations for weight.		X	M	____			.

259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260

MEASUREMENT - CALENDAR

(M - CAL)

		K	1	2	3	4	5	6
Given a model of a calendar, the student will be able to:								
M-CAL1.	Construct a calendar showing days, weeks, and the given month.	X	M	____	____	____	____	____.
M-CAL2.	Name the months of the year in sequential order.		X	____	____	____	____	____.
M-CAL3.	Write the abbreviations for the days of the week.		X	M	____	____	____	____.
M-CAL4.	Write the current date using the month, day and year.		X	M	____	____	____	____.
The student will be able to:								
M-CAL5.	a. Name the number of years in a:							
	decade					X	M	____.
	score					X	M	____.
	century					X	M	____.
	b. Indicate the number of years in a given number of:							
	scores					X	M	____.
	decades					X	M	____.
	centuries (Limit to one digit numbers)					X	M	____.
M-CAL6.	Find the date that is a specified number of days, weeks or months before or after a given date.				X	M	____	____.

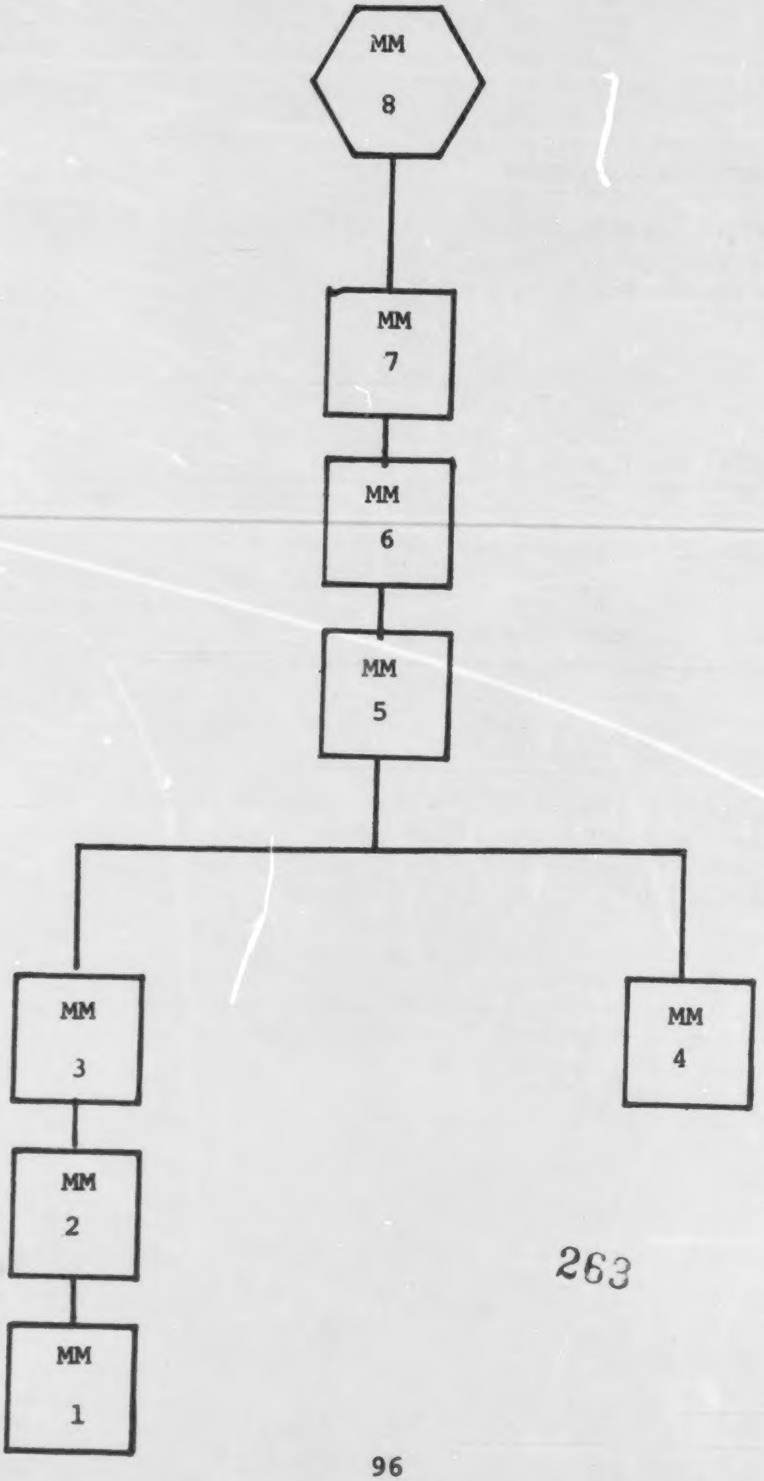
MEASUREMENT - CLOCK

(MC)

The student will be able to:

		Pre-K, K	1	2	3	4	5	6
MC-1.	Name and identify the clock as an instrument for measuring time.	X	M	___	___	___	___	___.
MC-2.	Name the time as shown on clock face.(hour)	X	M	___	___	___	___	___.
MC-3.	Name the time as shown on a clock face. (half hour)		X	M	___	___	___	___.
MC-4.	Name the time as shown on a clock face. (quarter hour) before and after the hour.			X	M	___	___	___.
MC-5.	Name the time as shown on a clock face. (Multiples of five)			X	M	___	___	___.
MC-6.	Name the time as shown on a clock face. (minute)				X	M	___	___.
MC-7.	Find the time that is a specified number of minutes before or after a given time, e.g. 20 minutes after 6:20, 20 minutes before 6:20, half hour before or after 6:20.					X	M	___.
MC-8.	Find the time that is a specified number of hours before or after a given time, e.g. 4 hours after 9:00 A.M., 3 hours before 9:15 P.M.					X	M	___.
MC-9.	Find the time that is a specified number of hours and minutes before or after a given time, e.g. two hours and fifteen minutes after 11:20, and two and one half hours before 11:20.						X ___	M

MEASUREMENT - MONEY


MM 8
MM 7
MM 6
MM 5
MM 3
MM 4
MM 2
MM 1

263

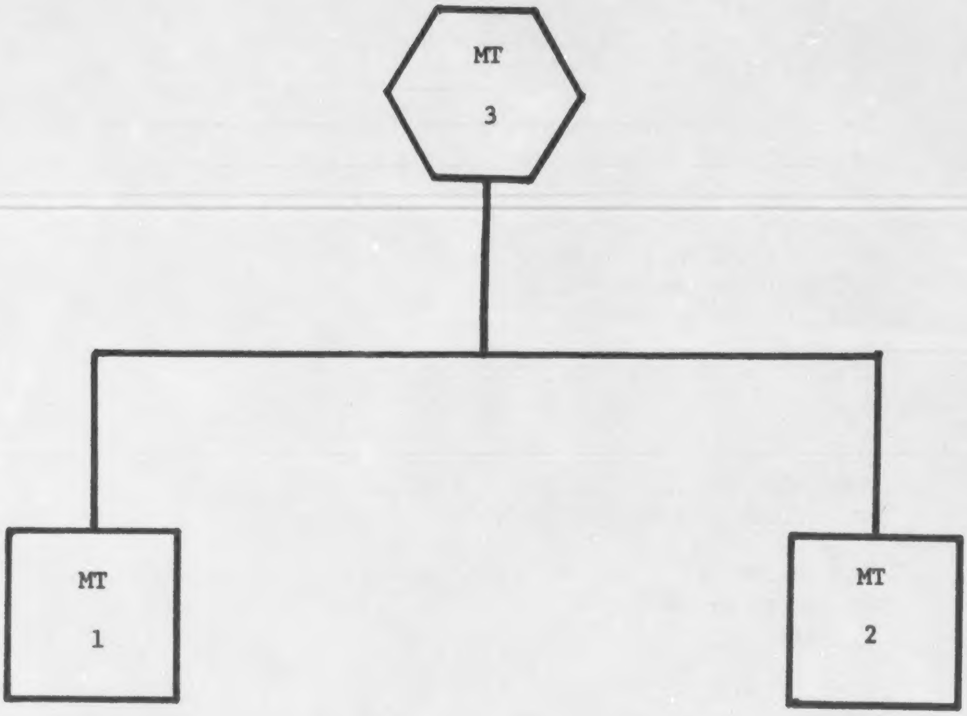
MEASUREMENT - MONEY

(MM)

The student will be able to:

		Pre-K, K	1	2	3	4	5	6
MM-1.	Name and identify U.S. coins.	X	M	____	____	____	____	____.
MM-2.	Name the coins, then record and compare the values of: penny, nickle, dime, quarter, half-dollar, silver dollar. (Use ¢ and dollar sign, and decimal point.)		X	M	____	____	____	____.
MM-3.	Identify, and name combinations of coins equivalent in value to: a dime, a quarter, a half-dollar.			X	M	____	____	____.
MM-4.	Identify and name among bills of different denominations. Limit to $100 bill.			X	M	____	____	____.
MM-5.	Read and write any money expressions in which the dollar sign and the decimal point are used.			X	M	____	____	____.
MM-6.	Identify and name combinations of coins equivalent in value to a dollar.			X	M	____	____	____.
MM-7.	Name coins with a value less than a dollar as a fractional part of a dollar. (Common and decimal fractions)					X	M	____.
MM-8.	Given a problem solving situation involving money, the student will be able to solve the problem and write the answer using decimal notation.						X	M.

MEASUREMENT - TEMPERATURE



265

MEASUREMENT - TEMPERATURE

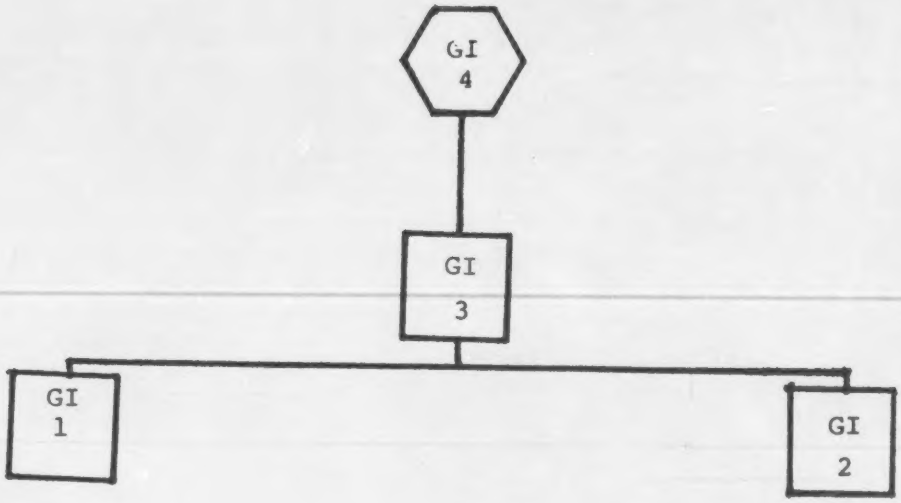
(MT)

The student will be able to:

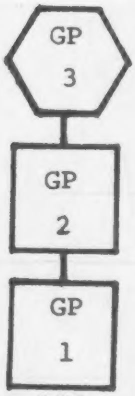
		Pre-K, K	1	2	3	4	5	6
MT-1.	Identify and name the instrument used to measure temperature. [thermometer]	X	M	____________________.				
MT-2.	Read and record temperature as shown on a: a. Fahrenheit thermometer, e.g., 45 degrees Fahrenheit (45° C) b. Celsius thermometer, e.g., 27 degrees Celsius (27° C)				X	M	_______.	
MT-3.	Name the boiling temperature of water on a: a. Fahrenheit thermometer b. Celsius thermometer				X	M	_______.	
MT-4.	Name the freezing temperature of water on a: a. Fahrenheit thermometer b. Celsius thermometer				X	M	_______.	
MT-5.	Read and record temperature below the freezing temperature of water as indicated on a: a. Fahrenheit thermometer b. Celsius thermometer				X	M	_______.	

GRAPHING

GRAPHING - INTERMEDIATE


GI 4
GI 3
GI 1
GI 2

GRAPHING - PRIMARY



GRAPHING - PRIMARY

(GP)

The student will be able to:		Pre-K, K	1	2	3	4	5	6
GP-1.	Given a model of a pictograph the student will be able to read a pictograph.	X	M	____.				
GP-2.	The student will be able to construct and read a pictograph.	X	M	____.				
GP-3.	Given a grid, the student will be able to construct and read a bar graph. (horizontal and vertical)		X	M	__.			

GRAPHING - INTERMEDIATE

(GI)

		Pre-K, K	1	2	3	4	5	6
GI-1.	The student will be able to construct and read a pictograph. (picture graph)					X	M	__.
GI-2.	Given a grid, the student will be able to construct and read a bar graph. (horizontal and vertical)					X	M	__.
GI-3.	Given a grid, the student will be able to construct and read a line graph.					X	M	__.
GI-4.	The student will be able to read a circle graph.						X	M

PRELIMINARY DRAFT PRELIMINARY DRAFT

COMPETENCY BASED CURRICULUM

OBJECTIVES FOR SCIENCE

GRADES ONE THROUGH SIX

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

DR. VINCENT E. REED
SUPERINTENDENT
1978

Dr. James T. Guines
Associate Superintendent
Office of Instruction

Mrs. Joan W. Brown
Special Assistant - CBC
Office of Instruction

OBJECTIVES FOR ELEMENTARY SCIENCE

TABLE OF CONTENTS

Preface iii
Hierarchy for Primary Level 2
Hierarchy for Intermediate Level 4

Objectives for Observing 7
  Primary Level
  Intermediate Level

Objectives for Measuring 11
  Primary Level
  Intermediate Level

Objectives for Using Space/Time Relationships 15
  Primary Level
  Intermediate Level

Objectives for Inferring/Predicting 17
  Primary Level
  Intermediate Level

Objectives for Communicating 21
  Primary Level
  Intermediate Level

Objectives for Classifying 25
  Primary Level
  Intermediate Level

Appendix 27

PREFACE

The elementary and junior high science hierarchies define objectives that are to serve as a focal point of competency-based instruction. These objectives contribute to the development of specified competencies.

Competencies that constitute scientific literacy are to:

1. IDENTIFY THE KEY IDEAS PRESENTED IN VARIOUS MEDIA.
2. ORGANIZE A BODY OF DATA INTO A STATEMENT WHICH WILL EFFECTIVELY CONVEY THE INFORMATION TO SOMEONE ELSE.
3. IDENTIFY THE VARIABLES IN A SIMPLE, PRACTICAL PROBLEM, AND ESTIMATE THE RELATIVE IMPORTANCE OF EACH VARIABLE.
4. MEASURE LENGTH, MASS, TIME, VOLUME AND TEMPERATURE USING COMMON METRIC UNITS.
5. DEMONSTRATE THE ABILITY TO THINK ANALYTICALLY ABOUT A SITUATION OR SET OF CONDITIONS BY:
    - (A) FORMULATING EXPECTED RESULTS BASED ON PREVIOUS EXPERIENCES.
    - (B) DESIGNING APPROPRIATE DATA-GATHERING PROCEDURE.
    - (C) GATHERING INFORMATION NEEDED TO TEST AN IDEA.
    - (D) WRITING LOGICAL STATEMENTS FROM A SET OF RELATED OBSERVATIONS.
6. EXHIBIT POSITIVE AND REALISTIC SELF-CONCEPTS BY:
    - (A) INVESTIGATION CAREER OPPORTUNITIES.
    - (B) DISCUSSING CRITICALLY ONE'S OWN ABILITIES AND FUTURE PLANS.
7. CITE EVIDENCE OF SCIENTIFIC CHANGES IN SOCIETY THAT EFFECT HUMAN PHYSICAL AND MENTAL WELL-BEING.
8. EXHIBIT COMPETENCY IN APPLYING SCIENTIFIC REASONING TO DECISIONS WHICH MUST BE MADE IN REAL LIFE SITUATIONS, (E.G., ECONOMIC STABILITY, POPULATION PRESSURES, FAMILY DECISIONS, CAREER DECISIONS).
9. CITE AT LEAST FIVE CONTRIBUTIONS MADE BY MEMBERS OF DIFFERENT ETHNIC GROUPS TO THE SCIENTIFIC AND TECHNOLOGICAL PROGRESS OF OUR SOCIETY AND THE LARGER WORLD SOCIETY.

10. DEMONSTRATE THE ABILITY TO WORK AS A TEAM MEMBER IN A FACT-FINDING SITUATION BY:

    (A) FULFILLING A ROLE IN THE ON-GOING CONDUCT OF AN EXPERIMENT.

    (B) GIVEN RESULTS FROM AN EXPERIMENT, DETERMINING WHICH DATA DOES NOT FOLLOW THE MAJORITY OF DATA.

    (C) DISCUSSING CRITICALLY, POSSIBLE SOUCRES OF ERROR IN AN EXPERIMENT.

    (D) COMPARING INFORMATION COLLECTED WITH THAT OF FELLOW STUDENTS.

    (E) SUGGESTING REASONS FOR SUPPORTING OR REJECTING A HYPOTHESIS BASED ON EXPERIMENTAL DATA.

11. CITE THE ROLES OF EXISTING GOVERNMENTAL AGENCIES RESPONSIBLE FOR MONITORING SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT WHICH AFFECT THE CONSUMER IN OUR SOCIETY.

12. DESCRIBE RECENT WORLD-WIDE SCIENTIFIC TECHNOLOGICAL DEVELOPMENTS WHICH HAVE AFFECTED LIVING CONDITIONS AND CITE EVIDENCES OF CHANGES RESULTING FROM SUCH DEVELOPMENTS.

13. GIVEN A LIST OF PURCHASE OPTIONS, COLLECT INFORMATION ON EACH OPTION AND DECIDE WHICH OPTION/S IS/ARE MORE ACCEPTABLE.

14. IDENTIFY HOBBIES AND OTHER LEISURE TIME ACTIVITIES WHICH ARE AVAILABLE TO PEOPLE INTERESTED IN SCIENCE.

Objectives listed in this document are organized into six strands or unifying themes for levels one through six. Within each strand, the objectives are sequenced in a progressive order of difficulty. The teacher will need to select from each strand those objectives that are appropriate for his or her students. This selection may be based upon diagnostic information from the students' previous teacher or from teacher made pre-tests administered before beginning a strand. Instruction should then be planned with attention to dependency relationships and with provision for intergrating skills from the various strands.

It is recognized that the continuous progress framework planned for our schools allows students to proceed through the sequenced set of objectives in accordance with their needs, rates, and learning styles. Therefore, the grade placement for an objective is simply representative of the level at which a learner is likely to be ready for instruction on that objective.

OBJECTIVES FOR ELEMENTARY SCIENCE

OVERVIEW OF SCIENCE CONTINUUM

The elementary levels of the science program include experience in learning the basic science skills of observing, measuring, using space/time relationships, inferring/predicting, communicating,and classifying. The content associated with the practice of each skill is designed to acquaint children with everyday phenomena in the immediate environment.

The junior high levels of the Curriculum reinforce the basic skills and synthesize them into the more sophisticated behaviors of communicating, measuring, classifying, formulating hypotheses, identifying variables, interpreting data and experimenting.

This K-9 hierarchy is designed to equip students with a basic knowledge of the nature of the scientific enterprise and how science skills can be applied to everyday situations.

The senior high program will begin with a Laboratory Science course designed to replace the present physical science course and continue with electives in the physical and biological sciences. Each course will have a set of objectives and criteria for success established. Only very preliminary work has been done on these courses.

The elementary and junior high hierarchies are divided into primary, intermediate and three junior high levels.

ACKNOWLEDGEMENTS

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Carol Euston - Resident Curriculum Writer

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Atlas Robinson - Thomas Elementary School
Sylvia Shugrue - Retired
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Gloria Tucker - Smothers Elementary School
Aubrey Jones - Moten Elementary School

The manuscript was typed by Carole Wallace.

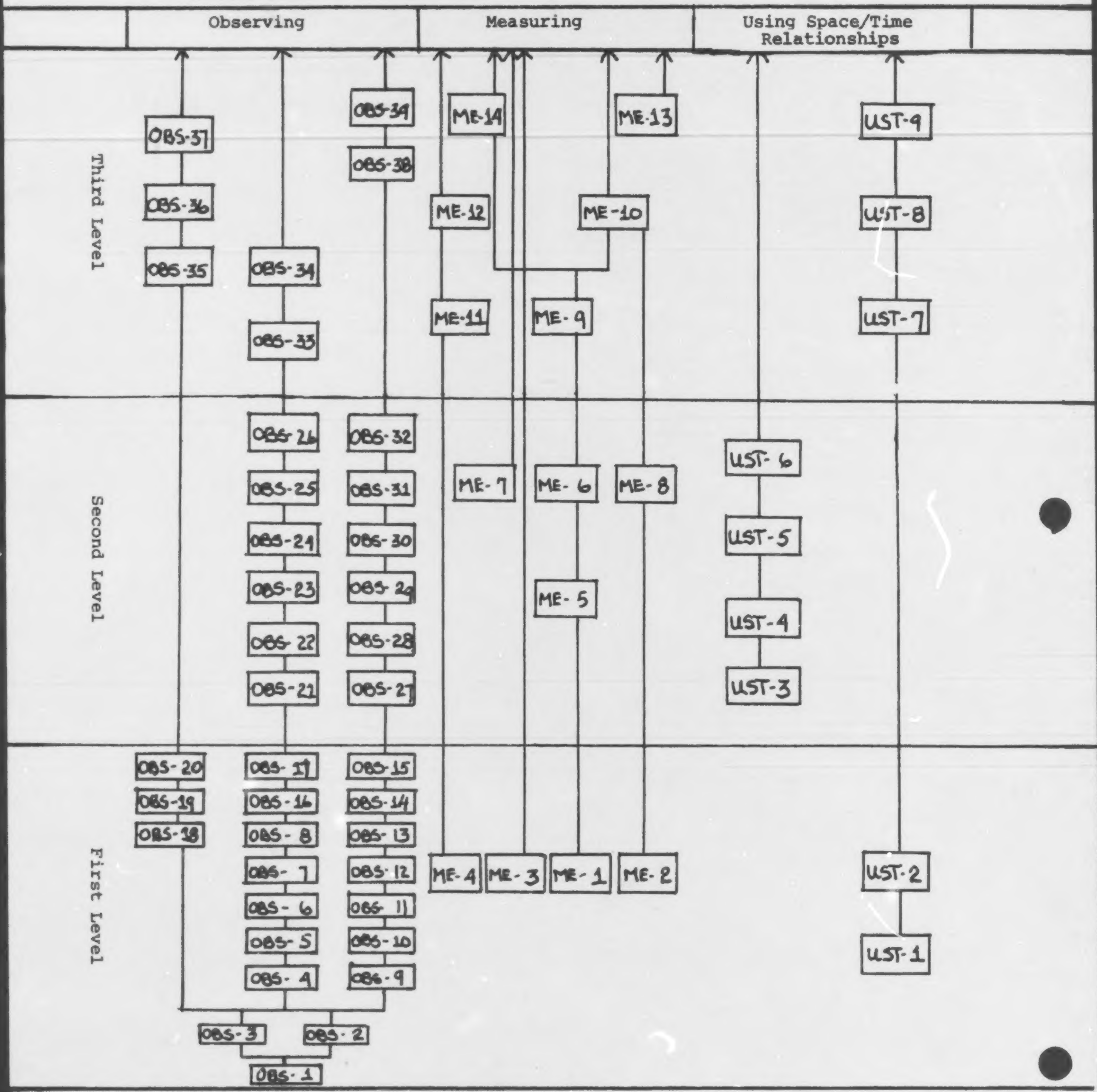
AN INVITATION

This publication is incomplete and still under development. Teachers are invited to submit instructional systems which are appropriate to be considered for inclusion in the next working draft.

HIERARCHIES FOR PRIMARY AND INTERMEDIATE LEVELS

5

PRIMARY LEVEL


Observing
Measuring
Using Space/Time Relationships
Third Level
Second Level
First Level
OBS-37
OBS-36
OBS-35
OBS-34
OBS-33
OBS-39
OBS-38
OBS-26
OBS-25
OBS-24
OBS-23
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OBS-3
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OBS-1
ME-14
ME-13
ME-12
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ME-7
ME-6
ME-8
ME-5
ME-4
ME-3
ME-1
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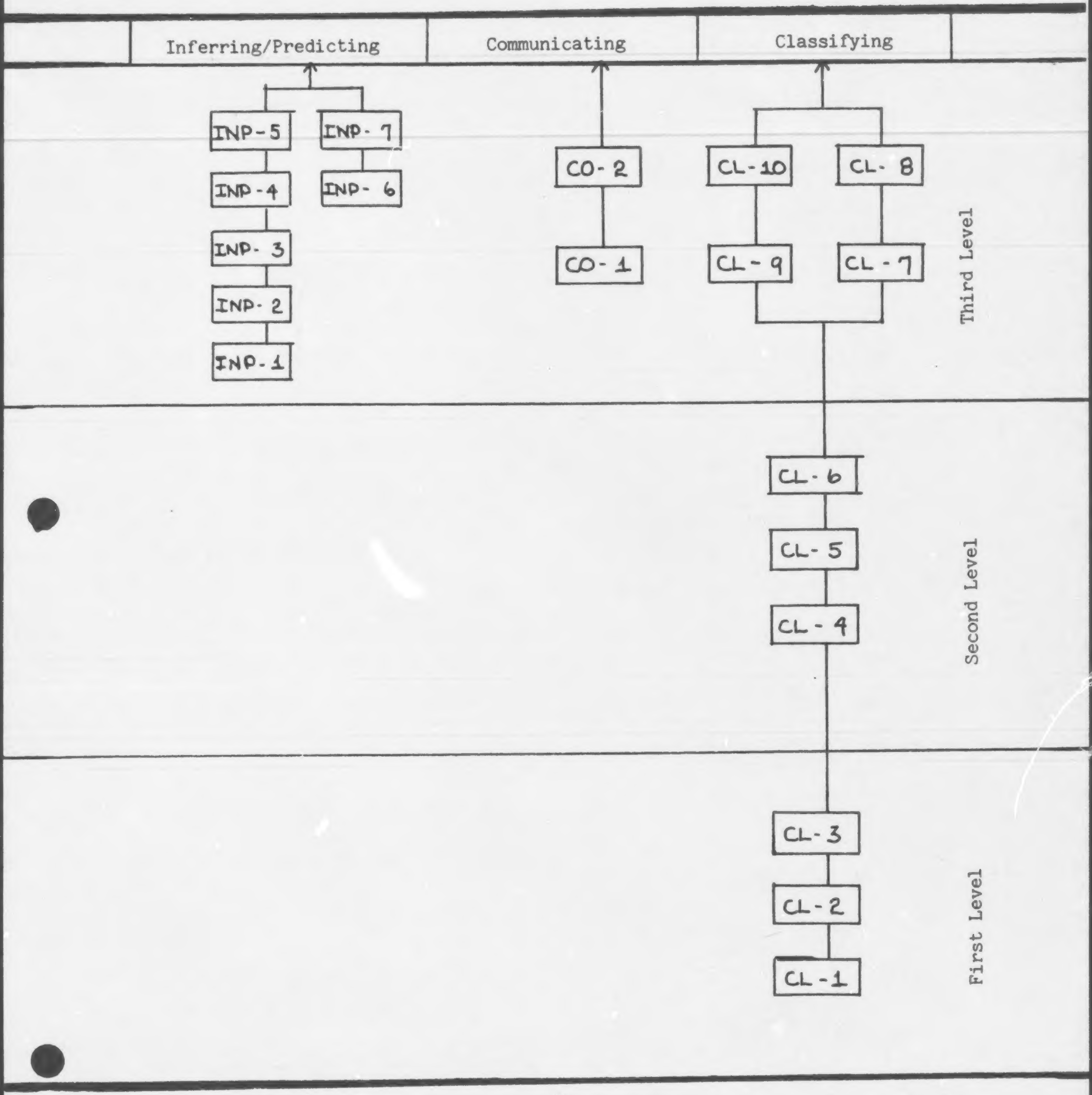
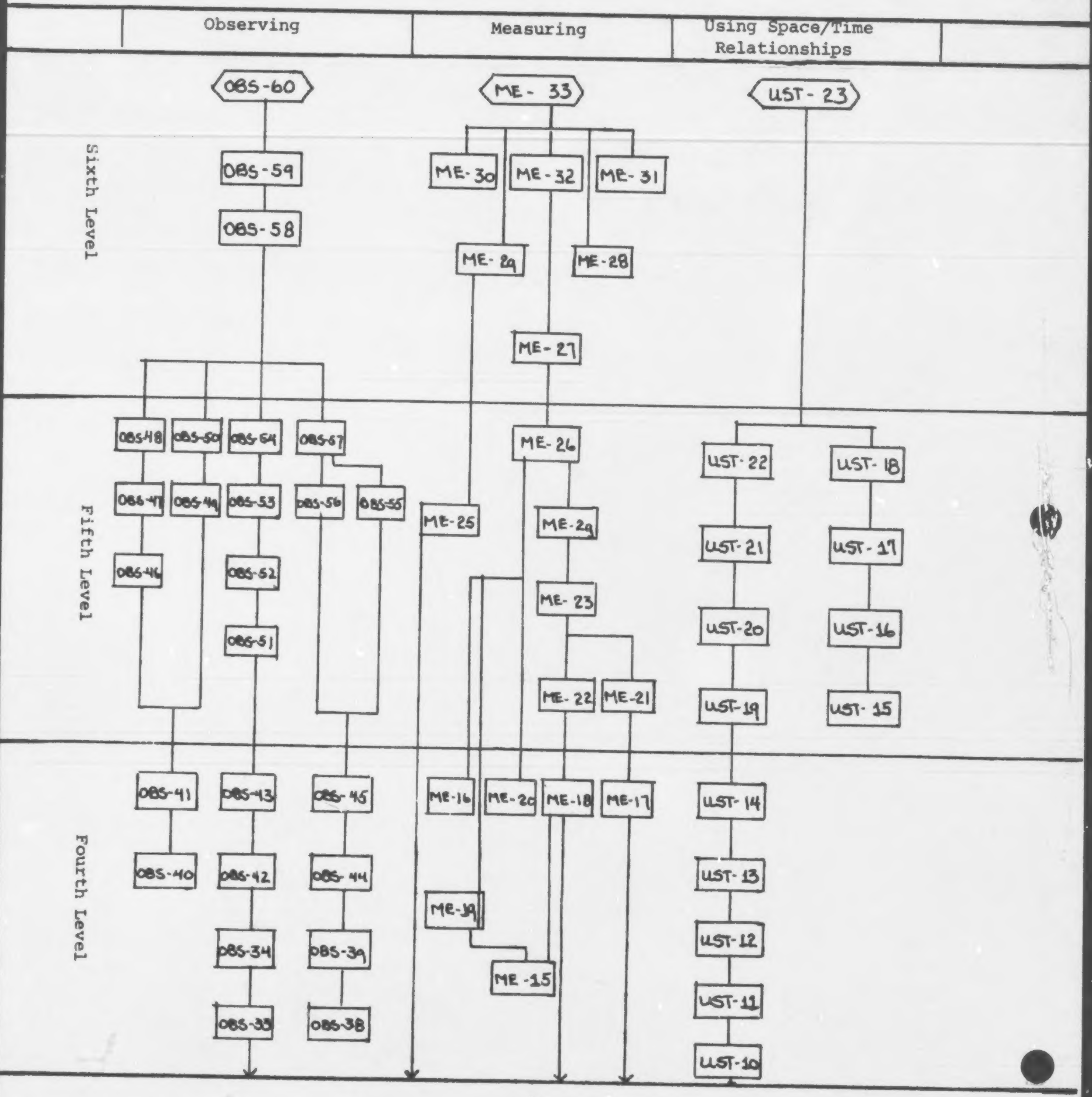
UST-5
UST-4
UST-3
UST-2
UST-1

HIERARCHIES


Inferring/Predicting
Communicating
Classifying
INP-5
INP-7
INP-4
INP-6
INP-3
INP-2
INP-1
CO-2
CO-1
CL-10
CL-8
CL-9
CL-7
Third Level
CL-6
CL-5
CL-4
Second Level
CL-3
CL-2
CL-1
First Level

INTERMEDIATE LEVEL


Observing
Measuring
Using Space/Time Relationships
Sixth Level
Fifth Level
Fourth Level
OBS-60
OBS-59
OBS-58
OBS-48
OBS-50
OBS-54
OBS-57
OBS-47
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OBS-34
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OBS-33
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ME-33
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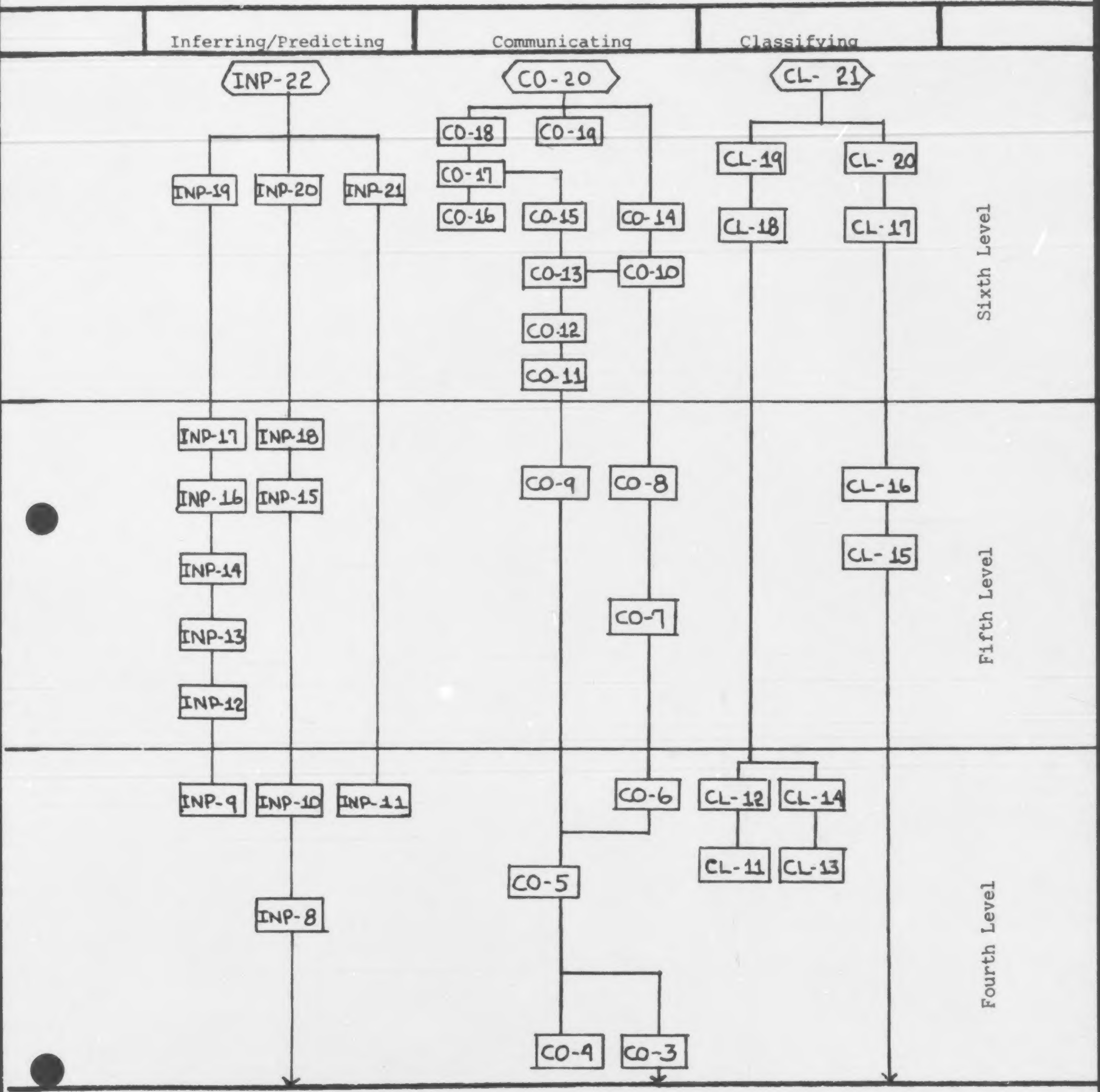
UST-11
UST-10

HIERARCHIES


Inferring/Predicting
Communicating
Classifying
INP-22
CO-20
CL- 21
CO-18
CO-19
CL-19
CL- 20
INP-19
INP-20
INP-21
CO-17
CO-16
CO-15
CO-14
CL-18
CL- 17
CO-13
CO-10
CO-12
CO-11
Sixth Level
INP-17
INP-18
INP-16
INP-15
CO-9
CO-8
CL-16
CL- 15
INP-14
INP-13
CO-7
INP-12
Fifth Level
INP-9
INP-10
INP-11
CO-6
CL-12
CL-14
CL-11
CL-13
CO-5
INP-8
CO-4
CO-3
Fourth Level

OBJECTIVES FOR OBSERVING

PRIMARY OBJECTIVES

Level 1. After completing the activities, the student will be able to:

Obs-1 Identify the sense organs.

Obs-2 Describe the use of the five sense organs.

Obs-3 Identify sense organs as tools of observation.

Obs-4 Identify the physical property of color of an array of objects.

Obs-5 Identify the physical property of shape of an array of objects.

Obs-6 Identify the physical property of size of an array of objects.

Obs-7 Identify the physical property of texture of an array of objects.

Obs-8 Given objects in the classroom, describe them by using at least three of the following properties- size, shape, color, texture.

Obs-9 Distinguish between plants and animals when shown a series of pictures.

Obs-10 Identify the parts of a plant.

Obs-11 Identify at least three different vegetable foods as specific parts of a plant.

Obs-12 Identify ways in which animals move.

Obs-13 Identify body coverings of animals.

Obs-14 Identify zoo animals, farm animals and forest animals in given pictures and tell which animals live in each home.

Obs-15 Identify animals as the source of three different foods.

Obs-16 Demonstrate that the direction of a force can be determined, (backward-forward-up-down-diagonally-around.)

Obs-17 Given a group of machines (toys), demonstrate and observe how they move. (Forces exerted: push, pull or self-powered.)

Obs-18 Given pictures which represent the night sky and the day sky, distinguish between the two by naming the objects seen.

Obs-19 Describe the characteristics of a given day in terms of the existing weather conditions.

Obs-20 Given pictures of scenes taken in different seasons, identify the season in which each picture was taken.

Level 2. After completing the activities the student will be able to:

Obs-21 Describe the relationship of an object, its shadow, and the position (angle) of the light source.

Obs-22 Identify substances as solids, liquids, or gases.

Obs-23 Identify a magnet and describe its property of attraction.

Obs-24 Distinguish between objects as magnetic or non-magnetic.

Obs-25 Identify the man-made and natural objects in the environment.

Obs-26 Describe objects in the environment according to at least two properties (appearance, texture, odor).

Obs-27 Distinguish between living and non-living things by their observable properties.

obs-28 Identify plants and animals as living things.

Obs-29 Identify three ways in which living things protect themselves.

Obs-30 Describe at least three requirements for plant growth.

Obs-31 Describe the observable changes in plants as they grow from seed to adult.

Obs-32 Identify three life functions of living things as moving, growing, and reproducing.

Level 3 After completing the activities, the student will be able to:

Obs-33 Demonstrate that objects expand when heated and contract when cooled.

Obs-34 Identify evidence that supports the presence of physical changes.

Obs-35 Identify the center, North, South, East and West directions as represented on a flat surface map.

Obs-36 Using teacher made maps of Washington, D. C., distinguish the N.E., S. E.,. N. W., and S.W. sections of the city.

Obs-37 Identify at least two bodies of water in the District of Columbia and their sources.

Obs-38 Identify vertebrate and invertebrate animals.

Obs-39 Identify the interdependence of plants and animals.

INTERMEDIATE

Level 4 After completing the activities, the student will be able to:

Obs-40 Describe how sound is produced by vibration.

Obs-41 Demonstrate the relationship between the rate of vibration and pitch in terms of fast/high and slow/low when given a tuning fork or other suitable device.

Obs-42 Identify the properties and two component parts of a solution. (Solute, Solvent)

Obs-43 Identify crystals by their observable properties of size, shape and color.

Obs-44 Describe observations of the interrelationships of organisms in aquatic and terrestrial environments, in terms of O_2 - CO_2 cycle or as predator/prey interaction.

Obs-45 Describe the interactions of a population of fruit flies and their physical environment.

Level 5 After completing the activities, the student will be able to:

Obs-46 Identify at least three instruments used to measure conditions of weather.

Obs-47 Identify the units used for measuring wind speed, temperature, air pressure, and humidity, as mph, degrees, p.s.i., and percent, respectively.

Obs-48 Identify at least four symbols from a simple weather map.

Obs-49 Demonstrate static electricity.

Obs-50 Describe how electricity changes to heat and light when meeting resistance and thus produces changes in the environment.

Obs-51 Distinguish at least six simple and complex machines which we use in everyday life.

Obs-52 Identify the six simple machines, given a sample of each one.

Obs-53 Describe how commonly used objects act as simple machines.

Obs-54 Demonstrate how simple machines can change the direction of a force and perform work, given commonly found simple machines.

Obs-55 Identify plants without seeds.

Obs-56 Identify the different stages in the life cycle of the mealworm.

Obs-57 Identify variations in organisms including rate of growth, weight and behavior.

Level 6 After completing the activities, the student will be able to:

Obs-58 Demonstrate that light travels in a straight line.

Obs-59 Identify materials as transparent, translucent or opaque.

Obs-60 Demonstrate the apparent bending of light rays when they pass from one medium to another.

OBJECTIVES FOR MEASURING

PRIMARY

Level 1

ME-1 Given a group of five similar objects, the student will order them by comparative size.

ME-2 Given four objects, the student will order them by weight from lightest to heaviest.

ME-3 Given varying quantities of substances such as water, sand and soil, the student will order their volume from least to greatest.

ME-4 The student will distinguish the degrees of warmth or coolness on an uncalibrated thermometer by associating relative temperature to the level of liquid in the thermometer.

Level 2

ME-5 The student will demonstrate the ability to measure the length of an object to the nearest meter.

ME-6 Given a variety of objects, the student will demonstrate the ability to measure the dimensions of these objects to the nearest centimeter.

ME-7 The student will demonstrate the ability to measure the volume of liquids in "unit measures".

ME-8 Given an equal arm balance, the student will order objects on the basis of weight.

ME-9 The student will demonstrate the ability to estimate linear dimensions of objects in terms of centimeters, decimeters and meters.

ME-10 The student will demonstrate the ability to estimate weight in units of grams and kilograms.

ME-11 The student will demonstrate the ability to measure and record temperature using a Celsius thermometer.

ME-12 The student will demonstrate the ability to measure and record temperature using a Celsius thermometer to include temperatures of boiling point, freezing point, and below freezing

ME-13 The student will demonstrate the ability to interpret a bar graph.

ME-14 Given a metric ruler or tape, the student will demonstrate the ability to measure specific line segments.

INTERMEDIATE

Level 4

ME-15 The student will demonstrate that there are spaces within some kinds of matter.

ME-16 The student will apply the rule for finding area.

ME-17 The student will be able to demonstrate the ability to locate points in a given set of coordinates.

ME-18 Given a metric scale and various objects the student will demonstrate a procedure for finding the weight of an object in standard units of a gram and a kilogram.

ME-19 Given a graduate cylinder or marked container, the student will demonstrate the ability to measure liquids to the nearest milliliter.

ME-20 Given three dimensional or pictorial representations of rectangular figures and a unit of volume, the student will be able to measure the volume of the figure by counting the number of unit cubes.

ME-21 The student will construct a graph, using the conventions of graphing (x and y coordinates, zero point, equal distribution of numerical values placed on lines, and labels.)

ME-22 The student will demonstrate the ability to measure force by using a spring scale.

ME-23 The student will demonstrate the ability to measure gravitational force and illustrate data by means of a bar graph.

ME-24 The student will describe the relationship between the amount of stretch and the amount of force placed on an elastic material.

INTERMEDIATE

Level 4

ME-25 The student will demonstrate the ability to measure and record weather conditions by using any three of the following instruments: an anemometer, barometer, hygrometer, or thermometer.

ME-26 The student will describe the relationships between 1000 cubic centimeters, a liter of water and a kilogram.

Level 6

ME-27 The student will be able to demonstrate a procedure for measuring the change in volume caused by phenomena such as evaporation, condensation, or transpiration.

ME-28 The student will be able to demonstrate a procedure for measuring rate of change.

ME-29 The student will be able to describe a procedure for measuring air and/or water pressure.

ME-30 The student will be able to demonstrate the ability to measure the relationship between weight and volume which is called the density of a substance.

ME-31 The student will be able to apply the rule that the angle of reflection equals the angle of incidence.

ME-32 Given tables showing the basic relationship between the elementary metric units of length, weight and volume, the student will be able to order any two measures in any two measures in any one of the three systems.

ME-33 The student will demonstrate the ability to determine the method of solving problems concerning length/area/ volume/ or weight using the metric system.

OBJECTIVES FOR USING SPACE TIME RELATIONSHIPS

PRIMARY

Level 1

UST-1 Given clocks or drawings of clocks, the student will be able to identify time intervals as related to daily activities. (Example: Recess or lunch time)

UST-2 Given a clock the student will be able to identify time intervals of short duration.

Level 2

UST-3 Given diagrams or charts the student will be able to describe lines and shapes in terms of open and closed curves.

UST-4 Given physical models of plane geometric shapes (triangle, square, rectangle, circle) the student will be able to identify the models according to their shape.

UST-5 The student will be able to name the shape of familiar objects in the physical environment.

UST-6 The student will be able to identify the two-dimensional shapes that make-up regular three-dimensional shapes: cone, sphere, pyramid, cube, cylinder.

Level 3

UST-7 From observations, the student will be able to describe the interval of time for the moon to orbit the earth.

UST-8 The student will be able to describe position in terms of up, down, right, and left in four out of five responses.

UST-9 The student will be able to describe the position of objects in terms of distance and direction using the designations, north, south, east, and west. The distance will be in terms of close, near, and far.

INTERMEDIATE

Level 4

UST-10 The student will be able to construct the balance points of symmetrical objects.

UST-11 Given three-dimensional objects or drawings, the student will be able to identify objects that have bilateral symmetry.

UST-12 The student will be able to identify lines of symmetry in geometric figures, letters of the alphabet, and in numerals.

UST-13 The student will be able to identify congruency in objects having symmetry.

UST-14 Given a set of objects or pictures the student will be able to identify those objects which show radial symmetry.

Level 5

UST-15 The student will be able to describe the motion and position of floating and non-floating objects.

UST-16 Given a turntable and a timing device, the student will be able to demonstrate familiar motion and rhythm relationships. (Example: heart beat/ pulse or pendulum)

UST-17 The student will be able to construct a pattern of motion using a pendulum.

UST-18 Given an object that is in motion, the student will be able to describe changes in the position of objects relative to each other, in three out of five examples.

UST-19 The student will be able to describe time intervals as related to specific events. (Example : innings in a game or from "one holiday to the next")

UST-20 The student will be able to describe the position of the moon, sun and earth, in relation to each other.

UST-21 Given a protractor the student will be able to construct any angle between zero and 360 degrees.

UST-22 The student will be able to demonstrate that the seasons are caused by the relative position of the earth in its orbit around the sun.

UST-23 The student will be able to describe relationships in the physical environment characterized by such factors as shapes, motion, symmetry, rate of position, change and the measurement of time.

OBJECTIVES FOR INFERRING/PREDICTING

PRIMARY

Level 3

INP-1 Given a series of statements about packaged articles, the student will identify those statements which are inferences about the contents of the packages, in three out of four instances.

INP-2 Given a group of objects to observe and a series of observations and inferences about the objects, the student will distinguish observations from inferences in three out of four instances.

INP-3 Given a familiar situation and an inference about the situation, the student will be able to describe observations which can be used to support the inference.

INP-4 Given a familiar object or situation, the student will be able to construct a plausible inference based on observations.

INP-5 The student will be able to demonstrate that inferences may need to be altered on the basis of additional observations or information.

INP-6 Given a living thing to observe and an inference about the living thing, the student will be able to identify an observation which supports the inference in three out of four instances.

INP-7 Given a series of pictures showing a sequence of the apparent shapes of the moon, the student will construct a prediction about what the next picture in the sequence should look like.

INTERMEDIATE

Level 4

INP-8 Given a polluted area to observe or a description of a polluted area, and statements about this area, the student will identify those statements which are inferences in four out of five instances.

INP-9 The student will construct predictions based on the hypothesis that the pitch of a sound when a bottle is struck is directly related to the amount of water present in the bottle.

INP-10 Given examples of solutes and solvents, the student will construct predictions of possible physical changes in various solutions.

INP-11 Given a food chain with one member removed, the student will construct inferences about the effect of this situation on other members of the food chain.

Level 5

INP-12 Given an opportunity to construct and observe an electromagnet, the student will construct inferences which relate magnetism and electricity.

INP-13 Given materials to construct a series and a parallel circuit, the student will construct predictions about the flow of electrons along a given path.

INP-14 Given examples of conductors and non-conductors, the student will construct predictions about which materials will or will not conduct electricity.

INP-15 Given two containers of water of different temperatures, the student will construct predictions about the rate of evaporation.

INP-16 The student will describe predictions about relative positions of bar magnets and their power of attraction.

INP-17 The student will construct predictions about how light rays are affected when passed through different media.

INP-18 Given charts showing weather data for a two week period, the student will construct predictions of future weather conditions using at least five different aspects of weather.

Level 6

INP-19 The student will be able to construct predictions about the relationship between the shadow of an object and the position of the light source.

INP-20 Given the opportunity to construct and observe models of volcanic eruptions, folding, faulting, formation of islands and mountains, the student will construct predictions about physical changes that affect the earth's form.

INP-21 The student will construct predictions about the interdependence of plants and animals, based on observations of a terrarium.

INP-22 Given a variety of situations, the student will construct plausible predictions about the expected outcomes of everyday occurences in the environment.

OBJECTIVES FOR COMMUNICATING

PRIMARY

Level 3

Co-1 Given the opportunity to observe evidence of air and solid waste pollution, the student will be able to describe the effects of pollution on the environment.

Co-2 Given a group of organisms or their pictures, the student will be able to describe those adaptations to the environment that will facilitate survival of the organism.

INTERMEDIATE

Level 4

Co-3 Given a list of several organisms, the student will be able to construct a food chain which illustrates plant and animal interdependence.

Co-4 The student will be able to construct a model which illustrates three layers of the earth (crust, mantle, and core)

Co-5 The student will be able to construct a model and data chart of the plantetary system, from which he will communicate specific information to others. (Include distance from sun, size, periods of revolution and rotation).

Co-6 Given pictures or models, the student will be able to describe constellations as being clusters of stars.

Level 5

Co-7 The student will be able to describe the earth as a closed system where the water cycle is the result of constant evaporation, condensation and precipitation.

Co-8 Using classroom simulations, the student will be able to describe conditions of the atmosphere necessary for the formation of at least two forms of precipitation.

CO-9 Presented with commonly encountered electrical situations, the student will be able to describe the safety rule needed for ten potentially hazardous electrical conditions.

Level 6

Co-10 Given information illustrating volcanic eruptions, folding, faulting, formation of islands and mountains, and probable movement of continents, the student will be able to describe the earth as undergoing constant change.

Co-11 The student will be able to describe the function of at least two of the following organs as they relate to the system of which it is a part. (Heart, lungs, kidneys, brain, stomach, and etc.)

Co-12 The student will be able to describe the function of at least two systems of the human body. They may be selected from the following body systems: Digestive, respiratory, excretory, circulatory, skeletal, or nervous.

Co-13 The student will be able to describe those adaptations of man which characterize him as the most highly developed of all organisms. The description must include man's moveable eyes, his ability to grasp objects, and, most importantly, his ability to think.

Co-14 The student will be able to describe four developmental stages in the life cycle of organisms (Ex. man) They will include birth, maturation, reproduction, and death.

CO-15 The student will be able to distinguish physical and social needs of organisms that influence the developmental stages of the organisms (Ex. man). (Include water, food, air, light, shelter, rest, physical space recreation, and companionship).

Co-16 The student will be able to describe the use and effects of drugs as either harmful or beneficial. Drugs such as aspirin, penicillin, alcohol, heroin, nicotine, and others, may be used as examples.

Co-17 The student will be able to describe the sun as the primary source of energy and the basic unit of all life.

CO-18 Given information on the technological improvements made in the aerospace industry, the student will be able to describe how air and space travel affect man in the 20th century.

Co-19 The student will be able to construct an opinion on the possible conversion to the metric system by the United States.

Co-20 The student will be able to demonstrate his ability to verbally and non-verbally communicate, in appropriate ways, his interpretation of observations made of changes in the environment.

OBJECTIVES FOR CLASSIFYING

PRIMARY

Level 1

CL-1 Given an assortment of objects, the student will be able to classify them according to their physical appearance.

CL-2 Given an array of objects the student will be able to distinguish between objects composed of one or more materials.

CL-3 Given an assorted group of animal pictures, the student will be able to construct a system that will classify animals according to farm or zoo animals, (body movement, body covering etc.)

CL-4 Given an audio tape of familiar sounds in the environment the student will be able to construct a system for classifying these sounds according to: their source (human sounds, machine sounds, etc.) and the object that made the sound (airplane, dog, etc.)

Cl-5 Given a terrarium, the student will be able to construct a system for classifying the living and non-living things in the terrarium.

Cl-6 Given an aquarium the student will construct a system for classifying the living and non-living things in the aquarium.

Cl-7 Given assorted pictures and/or live plants, the student will be able to demonstrate the use of a clssification system for plants.

Cl-8 Given assorted pictures and/or live plants, the student will be able to construct a system for classifying plants.

Cl-9 Given assorted pictures and/or live animals, the student will be able to demonstrate the use of a system for classifying animals.

Cl-10 Given an assortment of pictures and/or live animals, the student will be able to construct a system for classifying animals.

INTERMEDIATE

Level 4

Cl-11 Given several samples of soil, the student will demonstrate the ability to use a system for classifying soil.

CL-12 Given several samples of soil, the student will be able to construct a system for classifying soil .

Cl-13 Given a variety of rocks, the student will demonstrate the ability to use a system for classifying rocks.

Cl-14 Given a variety of rocks, the student will be able to construct a classification system for rocks.

Level 5

Cl-15 The student will be able to demonstrate the ability to classify animals as vertebrates or invertebrates.

Cl-16 The student will demonstrate the ability to classify vertebrates into five characteristic groups, (fishes, amphibians, reptiles, birds, mammals)

Level 6

Cl-17 The student will be able to construct a classification system for members of a controlled population and calculate the ratios of each species compared to the total population at the beginning and end of the study.

Cl-18 The student will demonstrate the ability to use a classification system for liquids.

Cl-19 Given a variety of liquids, the student will be able to construct a system for classifying liquids.

Cl-20 The student will be able to demonstrate the use of a punch card classification system which describes the characteristics of objects.

Cl-21 The student will be able to construct a punch card classification system which describes the characteristics of objects.

APPENDIX

GLOSSARY OF TERMS*

Action Words

The following terms are used to designate observable behaviors which, when exhibited by students, give evidence that the requested tasks have been successfully performed.

1. Construct	To make a physical object, a drawing or a written or verbal statement (such as an inference, hypothesis, or a test of any of these.)
2. Demonstrate	To perform a sequence of operations necessary to carry out a procedure.
3. Describe	To state observable properties sufficient to identify an object, event, or relationship.
4. Distinguish	To select an object or an event from two or more which might be confused.
5. Identify	To select a named or described object by pointing to it, touching it, or picking it up.
6. Name	To specify what an object, event, or relationship is called.
7. Order	To arrange three or more objects or events in a sequence based on a stated property.
8. Apply a Rule	To derive an answer to a problem by using a stated relationship or principle.
9. State a Rule	To communicate, verbally or in writing, a relationship or principle that could be used to solve a problem or perform a task.

*The definitions for action words and the processes of science are quoted, with permission, from Guide for Inservice Instruction, Science...A Process Approach Program published by the American Association for the Advancement of Science, Miscellaneous Publication 67-9, Washington, D.C., 1967

PROCESS (SKILLS) OF SCIENCE

In science a strong emphasis is placed on developing the ability of students to employ the processes of science to learn about the natural phenomena around them. These same processes are used by scientists in pursuing their own investigations. Many of the processes are useful in other areas of study and in everyday life.

Students develop facility with the basic processes in early grades, and move on to the more complex integrated processes in grades four through nine. The laboratory science course in senior high school synthesizes the use of all of the processes into a set of investigative skills which can be used in the life-long pursuit of solutions to problems.

Basic Processes

1. Observing - Using several or all of the senses...sight, touch, hearing, taste, and smell...to find out about an object. (Note: Unknown objects should not be tasted.) Quantitative (measured) observations are more precise than qualitative observations.

2. Inferring - Making an interpretation of an observation. If it is observed that a pond is frozen then we infer that the water temperature is below 0^{o} degrees centigrade. (Celsius)

3. Using Space/Time Relationships - Being able to describe the physical environment in terms of spatial relationships and changes with time. This includes shapes, symmetry, motion, rate of change in position, direction of change in position, and the measuring of time intervals.

4. Measuring - Choosing an appropriate measuring instrument, using it properly, recording the readings and carrying out calculations with the resulting data.

5. Communicating - To transfer information to someone else by means of oral and written words, diagrams, maps, graphs, mathematical equations, and visual demonstrations.

6. Classifying - To impose order on collections of objects or events. Biologists classify living things as plants or animals. Classification systems are used in everyday life for filing systems, telephone listings (classified ads), and personal activities such as shopping lists.

7. Predicting - Making a specific forecast of what future observations will be. Predictions are based on observations and inferences already made. For this reason they are different from making a guess.

INTEGRATED PROCESSES

1. Formulating Hypotheses - Hypotheses are statements of generalizations that include all objects or events of the same class. They are always based on observations or inferences. If it is observed that a dog sheds hair in the spring of the year, the generalization might be that all hair-covered animals shed in the spring. This generalization (hypothesis) could be tested by observing as many other animals as possible.

2. Controlling Variables - When scientists conduct investigations or test hypotheses, they first identify all the variables they can and then design a procedure to control each variable. To get good evidence they manipulate in an orderly way the variable stated in the hypothesis and watch for corresponding changes in another variable called the responding variable. All other variables are held constant insofar as is possible.

3. Interpreting Data - This is a process useful in nearly all activities. The reading of books, newspapers, charts, graphs, maps, and pictures requires us to interpret. The attempt to find the meaning in data, in whatever form we collect it, leads to the construction of inferences, predictions, and hypotheses.

4. Defining Operationally - To state the meaning of a term in the context of one's own experience. The definition should state "what you do" and "what you observe" in the physical sciences. In life science the definitions are usually descriptive. These definitions are more useful to scientists and children than those in a dictionary. To define "mouse" as the tiny grey animal with fur and beady eyes that crawls through a hole in the wall may be more useful to children than saying that it is a small member of the genus Mus in the rodent family.

5. Experimenting - This is the cumulative process that includes all the other processes. To do an experiment it is necessary to make some observations, formulate a hypothesis, identify the variables which are present, decide which one is to be manipulated, construct a test with the other variables controlled, collect and interpret the data, and decide whether the hypothesis is to be supported or rejected.

PRELIMINARY DRAFT PRELIMINARY DRAFT

COMPETENCY BASED CURRICULUM

MATHEMATICS SCOPE AND SEQUENCE

GRADES SEVEN THROUGH NINE

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

DR. VINCENT E. REED
SUPERINTENDENT
1978

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TABLE OF CONTENTS

Objectives	Code	Page
Preface		
Curriculum Production Committee		
Systems of Numeration	N	
Hierarchy		1
Objectives		2
Sets, Operations With Whole Numbers and Their Properties	SW	
Hierarchy		3
Objectives		4
Non-Negative Rational Numbers (Fractional Numerals)	NNR	
Hierarchy		5
Objectives		6-8
Percents	P	
Hierarchy		9
Objectives		10
Geometry and Measurement (Non-Metric) Part I	GM	
Hierarchy		11
Objectives		12
Geometry and Measurement (Similar Polygons) Part II	GM	
Hierarchy		13
Objectives		14-15
Integers	I	
Hierarchy		16
Objectives		17
Introduction to Algebra	IA	
Hierarchy		18
Objectives		19
Real Numbers (Rational and Irrational)	RN	
Hierarchy		20
Objectives		21
Probability and Statistics	PS	
Hierarchy		22
Objectives		23

PREFACE

The Junior High School Mathematics Scope and Sequence defines objectives that are to serve as a focal point of competency-based instruction. These objectives contribute to the development of specified competencies.

Competencies that constitute mathematical literacy essential for effective life-role functioning and toward which the general mathematics program of the D. C. Public Schools is directed are:

READING, WRITING AND USING NUMBERS CORRECTLY IN RECEIVING OR CONVEYING QUANTITATIVE INFORMATION.

PERFORMING COMPUTATIONS APPLICABLE IN CONSUMER SITUATIONS.

ANALYZING PROBLEMS AND APPLYING RULES OF LOGIC IN REACHING VALID CONCLUSIONS.

ESTIMATING MEASUREMENTS AND RESULTS OF COMPUTATIONS.

CHECKING RESULTS FOR REASONABLENESS.

MEASURING DISTANCE, WEIGHT, TIME, CAPACITY AND TEMPERATURE WITH APPROPRIATE INSTRUMENTS OR DEVICES.

IDENTIFYING GEOMETRIC FORMS FOUND IN THE ENVIRONMENT AND APPLYING RULES FOR FINDING THEIR PERIMETERS, AREAS, AND VOLUMES AS NECESSARY IN MEASUREMENT AND PROBLEM SOLVING.

INTERPRETING AND CONSTRUCTING SIMPLE TABLES, CHARTS, GRAPHS, AND SCALE DRAWINGS.

APPLYING JUNIOR HIGH SCHOOL CONCEPTS OR PROBABILITY IN DETERMINING THE LIKELIHOOD OF FUTURE EVENTS.

IDENTIFYING USES OF THE COMPUTER IN EDUCATION, FINANCIAL TRANSACTIONS, AND IN INFORMATION STORAGE AND RETRIEVAL.

Objectives listed in this document are organized into nine strands or unifying themes for Grades Seven through Nine. Within each strand, the objectives are sequenced in a progressive order of difficulty.

The teacher will need to select from each strand those objectives that are appropriate for his/her students. This selection may be based upon diagnostic information from the Prescriptive Mathematics Test results or from informal instruments. Instruction should then be planned with attention to dependency relationships and with provision for integrating skills from the various strands.

It is recognized that the continuous progress framework planned for our schools allows students to proceed through the sequenced set of objectives in accordance with their needs, rates, and learning styles. Therefore, the grade placement for an objective is simply representative of the level at which a learner is likely to be ready for instruction on that objective. In the grade level designations, an "X" suggests the level of introduction of a skill and an "M" is used to suggest levels at which there should be repeated or additional experiences for the student.

The mathematics curriculum is continually being refined to serve the needs of our students. Each teacher is asked to contribute recommendations for modification or revision.

ACKNOWLEDGEMENTS

The Competency-Based Curriculum Scope and Sequence for Junior High School Mathematics has been prepared by the following persons:

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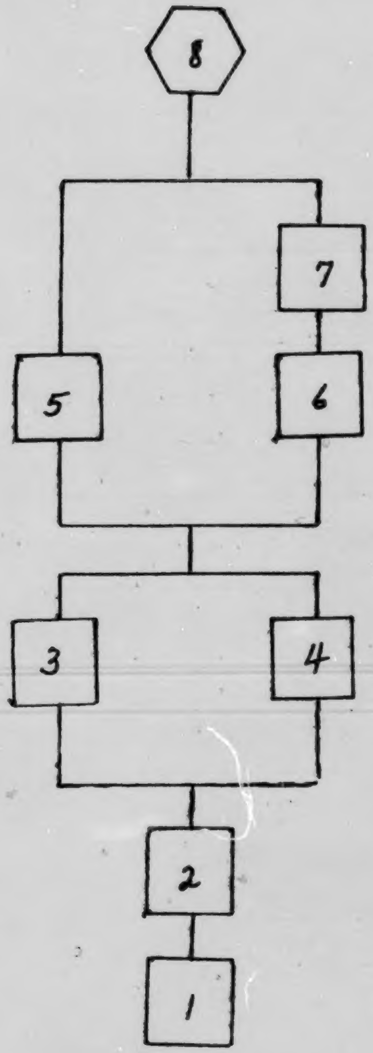


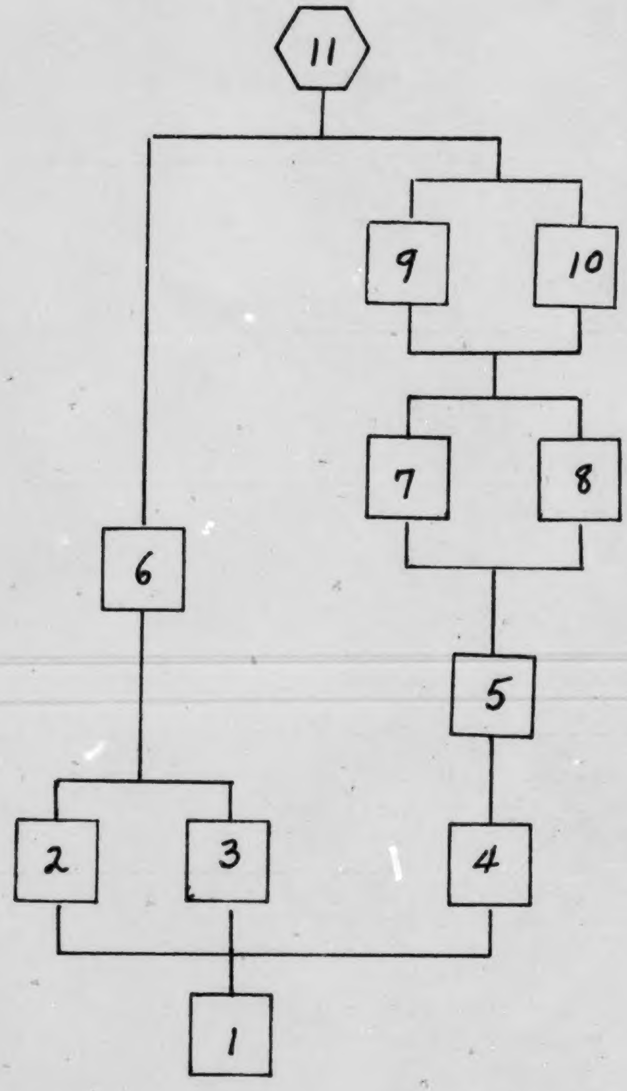
SYSTEMS OF NUMERATION

(N)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
N-1.	Given a set of Roman numerals, write a base ten numeral in this system.	X		
N-2.	Given a Roman numeral, write correctly as a base ten numeral in at least four out of five attempts.	X		
N-3.	Write in numerals any given whole number through billions.	X		
N-4.	Read any given whole number through billions.	X		
N-5.	Given a base ten numeral, write it correctly in expanded notation including its exponential form. This should be done correctly in at least four out of five attempts.	X	X	
N-6.	Given a numeral expressed in expanded notation or exponential form, write correctly the standard numeral in at least four out of five attempts.	X	X	
N-7.	Given a base ten numeral, write it correctly in scientific notation in at least four out of five attempts.		X	
N-8.	Round off a given whole number to any specified place value through billions.		X	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310

SETS, OPERATIONS WITH WHOLE NUMBERS AND THEIR PROPERTIES

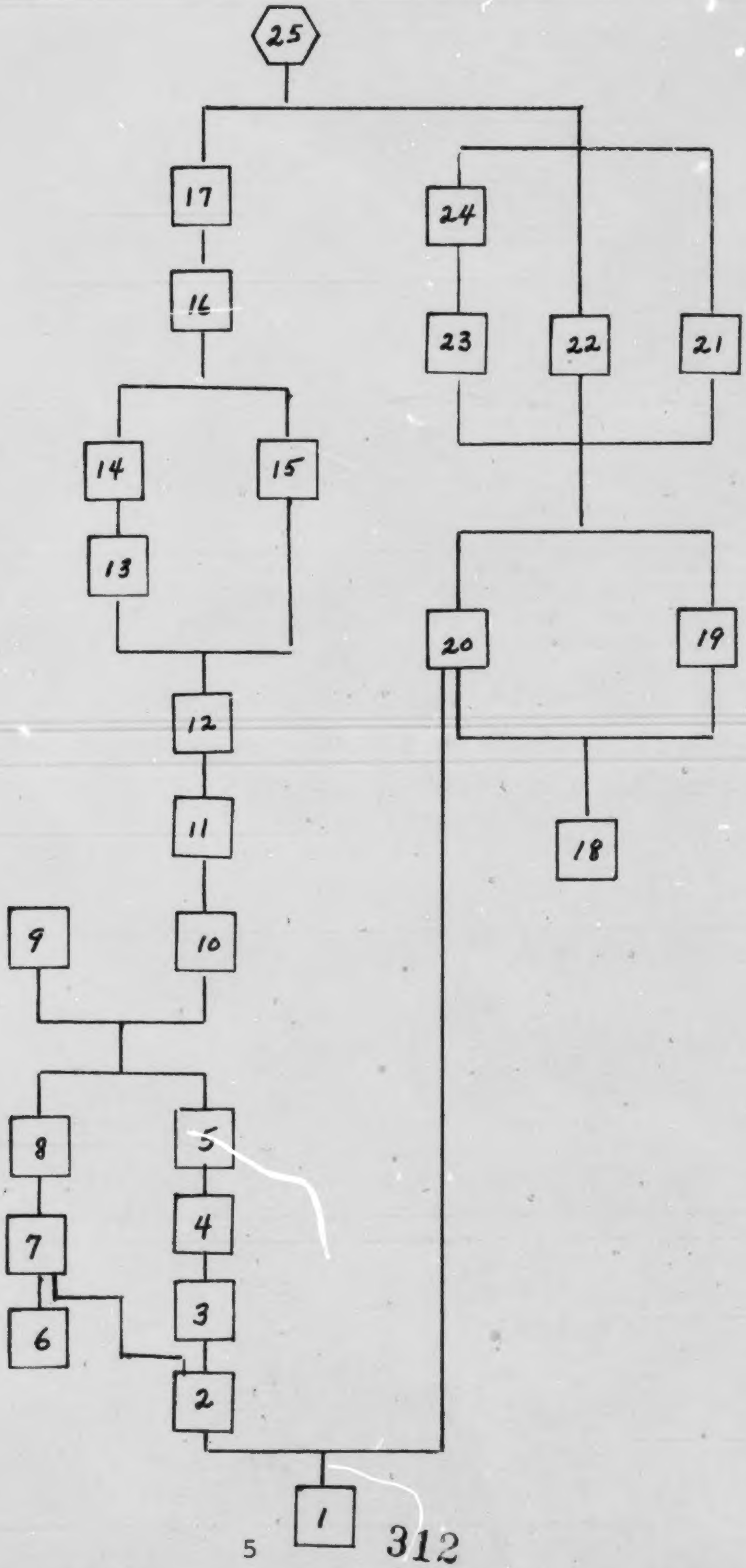
(SW)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
SW-1.	Describe set, subset, element or member of a set, and empty set.	X		
SW-2.	Given a set, classify it as finite or infinite.	X		
SW-3.	Describe a given set using the rule method and roster method.	X		
SW-4.	Arrange a given set of whole numbers in decreasing or increasing order. Show the relationship of a given set of numbers using the appropriate symbols: " < ", " = ", or " >."	X		
SW-5.	Identify the following kinds of numbers: Odd, even, prime and composite, in a given set of whole numbers.	X	X	X
SW-6.	Find the prime factorization of a given number.	X	X	X
SW-7.	Identify and illustrate the special properties of zero.	X	X	X
SW-8.	Identify and illustrate the special properties of the number one.	X	X	X
SW-9.	Given a set of whole numbers, perform the operations of addition and multiplication, demonstrating the use of the commutative and associative properties. Perform the operations accurately in at least four out of five attempts.	X	X	X
SW-10.	Given a set of whole numbers, perform the operations of subtraction and division accurately, in at least four out of five attempts.	X	X	X
SW-11.	Given verbal problems which require operations with whole numbers, solve correctly at least three of the four problems.	X	X	X

Non-Negative Rational Numbers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312

NON-NEGATIVE RATIONAL NUMBERS
(Fractional Numerals)

(NNR)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
NNR-1.	Name a given fraction that is represented pictorially as a part of a whole, or a part of a set; name the division that is indicated by a given fraction.	X		
NNR-2.	Name an equivalent fraction for a given fraction in at least four out of five attempts.	X	X	X
NNR-3.	Name a given mixed number or whole number as a fraction and a given fraction greater than or equal to one as a whole or mixed number in simplest form. Name the correct number in at least four out of five attempts.	X	X	X
NNR-4.	Given common fractions, mixed numbers and whole numbers, find the correct product of numbers in fractional form, in at least four out of five attempts.	X	X	X
NNR-5.	Given common fractions, mixed numbers, and whole numbers, find the correct quotient of numbers in fractional form, in at least four out of five attempts.	X	X	X
NNR-6.	Find the least common multiple of a given set of numbers.	X	X	X
NNR-7.	Given a pair of common fractions, find the sum and difference correctly, in at least four out of five attempts.	X	X	X
NNR-8.	Given a pair of mixed numbers, find the sum and difference correctly, in at least four out of five attempts.	X	X	X
NNR-9.	Arrange in increasing or decreasing order a given set of fractions. Given a set of fractions, illustrate the property of density.	X	X	X
NNR-10.	Given a set of fractions, identify a complex fraction.	X	X	X

NON-NEGATIVE RATIONAL NUMBERS
(Fractional Numerals)

(NNR)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
NNR-11.	Name a given complex fraction as a common fraction in simplest form. Name the correct fraction in at least four out of five attempts.	X	X	X
NNR-12.	Write a ratio in simplest form when comparing the number of objects in two given sets.	X	X	X
NNR-13.	Given the relationship of two sets stated in sentence form, write an appropriate ratio.	X	X	X
NNR-14.	Describe a proportion, when given a set of ratios.	X	X	X
NNR-15.	Determine if two given ratios are equal.	X	X	X
NNR-16.	Given three terms in a proportion, find the fourth term.	X	X	X
NNR-17.	Construct and solve a proportion appropriate to a given problem.	X	X	X
NNR-18.	Read and write a given decimal fraction.	X	X	X
NNR-19.	Round off a given decimal fraction to a specified place value.	X	X	X
NNR-20.	Name a given common fraction as a decimal, and name a given decimal fraction as a common fraction. (Fractions whose denominators are factors of powers of ten)	X	X	X
NNR-21.	Given pairs of decimal fractions, find the correct sum and difference in at least four out of five attempts.	X	X	X
NNR-22.	Given pairs of decimal fractions, find the correct product in at least four out of five attempts.	X	X	X
NNR-23.	Given a pair of decimal fractions, find the correct quotient in at least four out of five attempts.	X	X	X

NON-NEGATIVE RATIONAL NUMBERS
(Fractional Numerals)

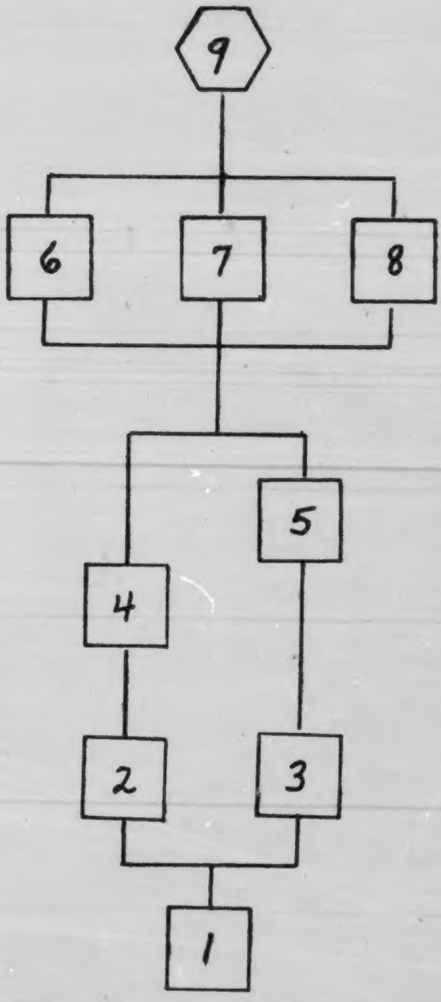
(NNR)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
NNR-24.	Write a given fractional numeral as a terminating or repeating decimal.	X	X	X
NNR-25.	Given verbal problems which require operations with common and decimal fractions, solve them correctly in at least four out of five attempts.	X	X	X

PERCENTS



316

PERCENTS

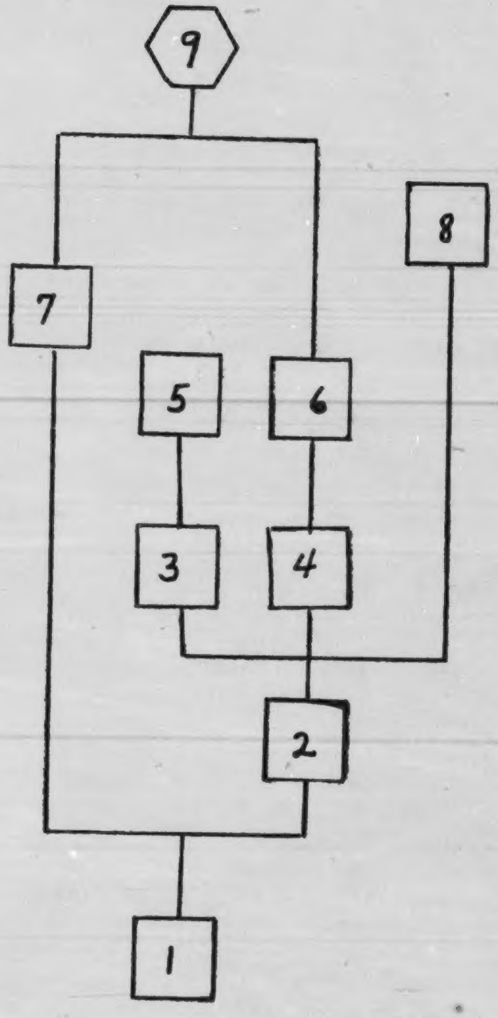
(P)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
P-1.	Illustrate graphically the meaning of a given percent and state it as a ratio with a denominator of 100.	X		
P-2.	Given a common fraction with a denominator of 10 or 100, change it to a percent and given a percent, convert it to a fraction in simplest form.	X	X	X
P-3.	Given a decimal fraction, convert it to a percent and given a percent, convert it to a decimal fraction.	X	X	X
P-4.	Given a fraction with a denominator other than 10 or 100 or given a mixed number, name it as a percent.	X	X	X
P-5.	Given a percent less than one percent, name its decimal equivalent.		X	X
P-6.	Given a number and a rate of percent, find the percentage correctly in at least four out of five attempts.	X	X	X
P-7.	Given a number, find what percent it is of another given number. At least four, out of five attempts should be correct.	X	X	X
P-8.	Given the rate and the percentage, find the correct base in at least four out of five attempts.		X	X
P-9.	Solve a given one or two-step verbal problem involving percent and including discount, commission, simple interest and sales tax. Solve at least four out of five problems correctly.	X	X	X

Geometry and Measurement
(Non-Metric)
Part I



318

GEOMETRY AND MEASUREMENT
(Non-Metric)

PART I

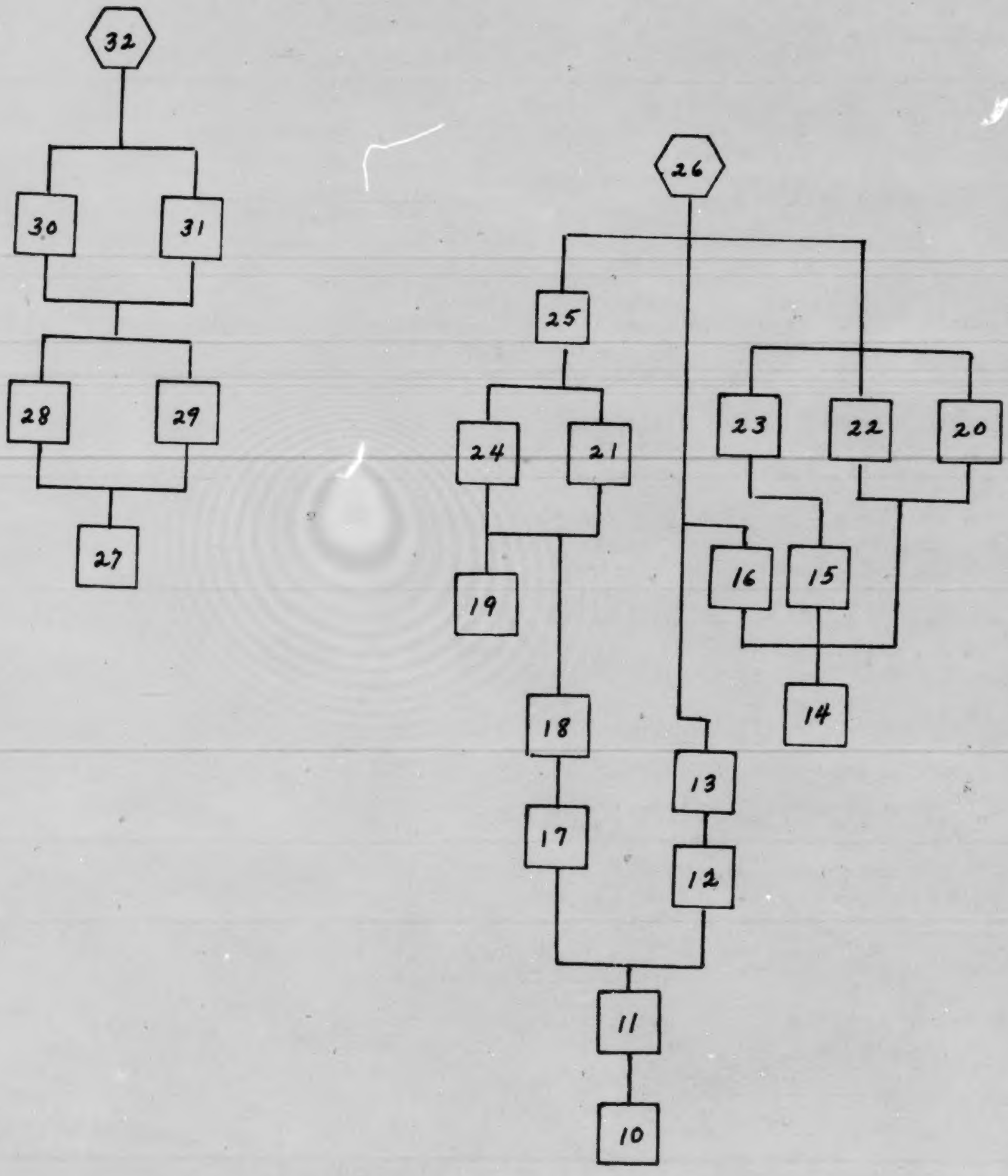
(GM)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
GM-1.	Identify: Point, line, line segment, ray and plane, when given an illustration of each. Illustrate the same when given the name of each.	X		
GM-2.	Describe horizontal, vertical and oblique lines, also parallel, intersecting, perpendicular and skew lines.	X		
GM-3.	Given a set of angles, identify the acute, right and obtuse angles. Illustrate an acute, obtuse and a right angle.	X		
GM-4.	Illustrate a polygon with ten or less sides when given its name. Name a polygon with ten or less sides when given the model.	X		
GM-5.	Illustrate when given the name and identify, when given the models of a scalene, an isosceles and an equilateral triangle.	X		
GM-6.	Illustrate and identify given special quadrilaterals.	X		
GM-7.	Given a circle, identify its parts: Arc, semicircle, center, radius, diameter, chord.	X		
GM-8.	Using a compass and a straight edge, construct given line segments, angles and perpendicular lines.	X		
GM-9.	Given a set of geometric space models, identify and describe: Cube, rectangular solid, cylinder, sphere, prism, pyramid, and cone.	X		

Geometry and Measurement
(Similar Polygons)
Part II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GEOMETRY AND MEASUREMENT
(Similar Polygons)

PART II

(GM)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
GM-10.	Measure the length of a given line segment in Metric and English measurements.	X		
GM-11.	Name the precision and greatest possible error of a given measurement in at least four out of five attempts.		X	
GM-12.	Given a polygon, find its perimeter by measuring.	X		
GM-13.	Given the dimensions of a polygon, apply the rule to find its perimeter accurately in at least four out of five attempts.	X	X	X
GM-14.	Given the appropriate dimensions of a parrallelogram, apply the rule to find its area. Compute accurately in at least three out of four attempts.	X	X	X
GM-15.	Given the appropriate dimensions of a triangle, apply the rule to find its area. Compute accurately in at least three out of four attempts.	X	X	X
GM-16.	Given the appropriate dimensions of a trapezoid, apply the rule to find the area. Compute accurately in at least three out of four attempts.	X	X	X
GM-17.	Find the circumference of a given circle by measuring with a string and applying it to a ruler.	X		
GM-18.	Given the measure of the radius or the diameter of a circle, apply the rule to find its circumference. Compute accurately in at least three out of four attempts.	X	X	X
GM-19.	Given the measure of the radius or diameter of a circle, apply the rule to find its area. Compute accurately in at least three out of four attempts.	X	X	X
GM-20.	Find the surface area of a rectangular prism and cube, when given the appropriate dimensions. Compute accurately in at least three out of four attempts.	X	X	X

GEOMETRY AND MEASUREMENT
(Similar Polygons)

PART II

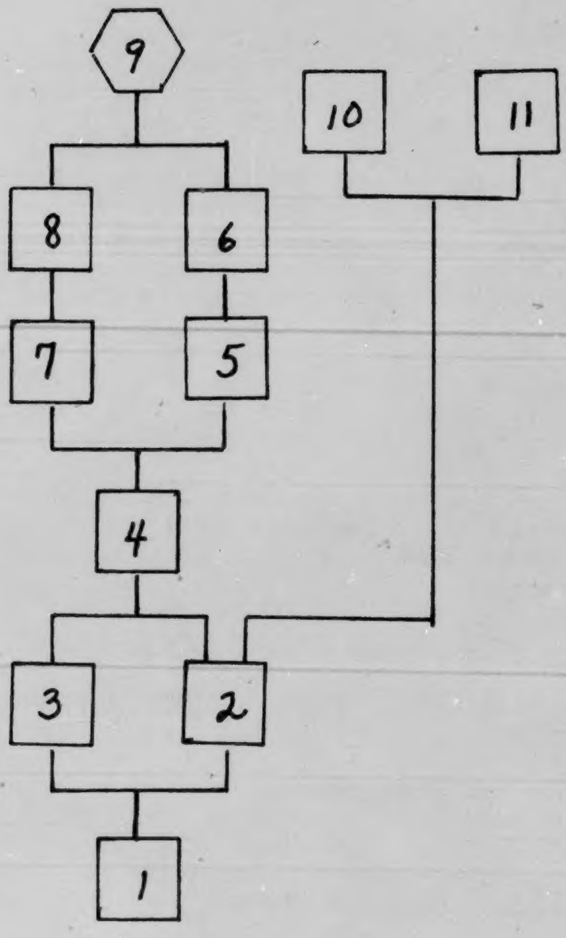
(GM)

Objectives

The student will be able to:

			LEVEL	
		7	8	9
GM-21.	Given the appropriate dimensions of a cylinder, find its surface area. Compute accurately in at least three out of four attempts.	X	X	X
GM-22.	Given the dimensions of a rectangular prism, apply the rule to find its volume. Compute accurately in at least three out of four attempts.		X	X
GM-23.	Given the appropriate dimensions of a right prism, apply the rule to find its volume. Compute accurately in at least three out of four attempts.	X	X	X
GM-24.	Given the appropriate dimensions of a cylinder, apply the rule to find its volume. Compute accurately in at least three out of four attempts.	X	X	X
GM-25.	Given the appropriate dimensions, apply the rule to find the volume of a pyramid and a cone. Compute accurately in at least three out of four attempts.	X	X	X
GM-26.	Select an appropriate formula and find the required measure of perimeter, area, surface area, or volume for a given problem situation. Solve correctly in at least three out of four attempts.	X	X	X
GM-27.	Read the measurement of a given angle using a protractor.	X		
GM-28.	Given the measure of each angle in a pair of angles, identify complementary and supplementary angles.	X	X	X
GM-29.	Determine the sum of the measures of the angles of: (a) A given triangle and (b) A given quadrilateral.	X	X	X
GM-30.	Given appropriate measurements, identify congruent triangles.	X	X	
GM-31.	Given a set of polygons, identify pairs of similar polygons.		X	
GM-32.	Given problems involving similar figures, solve them correctly in at least three out of four attempts.		X	X

INTEGERS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323

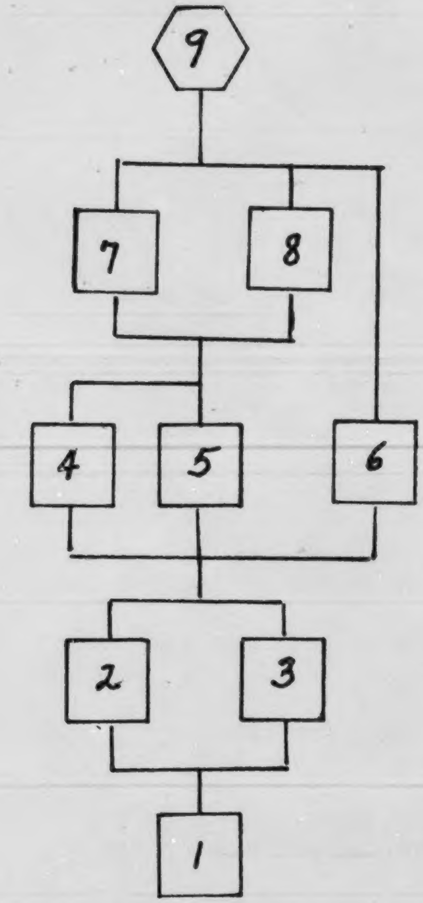
INTEGERS

(I)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
I-1.	Describe the set of integers.		X	X
I-2.	Given a number line, locate and label a point which corresponds to a given integer.		X	X
I-3.	Given a set of integers, arrange them in increasing and decreasing order.		X	X
I-4.	Given an integer, name its absolute value. Simplify given expressions containing absolute value.		X	X
I-5.	Given a set of integers, find the correct sum in at least four out of five attempts.		X	X
I-6.	Given a pair of integers, find the correct difference in at least four out of five attempts.		X	X
I-7-	Given a set of integers, find the correct product in at least four out of five attempts.		X	X
I-8.	Given a pair of integers, find the correct quotient in at least four out of five attempts.		X	X
I-9.	Given verbal problems that require operations with integers, solve correctly in at least four out of five attempts.		X	X
I-10.	Locate a point in the coordinate plane, when given an ordered pair of integers.		X	X
I-11.	Name the ordered pairs of given points in the coordinate plane.		X	X



325

INTRODUCTION TO ALGEBRA

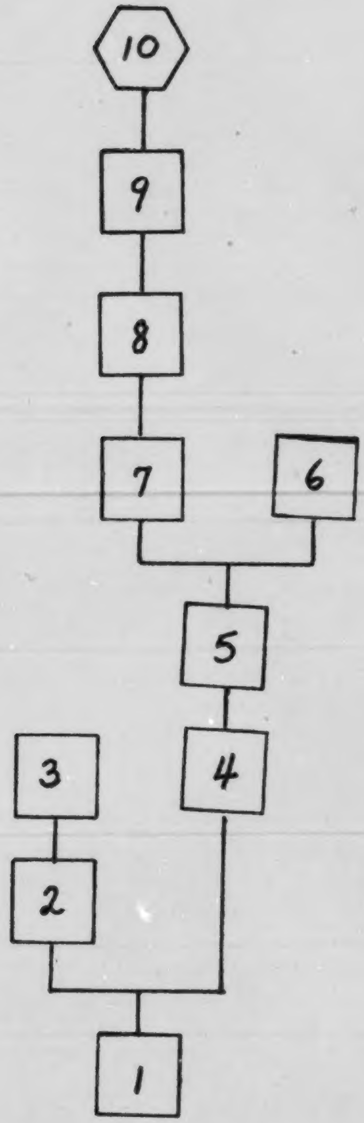
(IA)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
IA-1.	Identify word phrases and sentences, when given corresponding algebraic expressions.	X	X	X
IA-2.	Given a word sentence about numbers, translate it into a number sentence. Write correct sentences in at least four out of five attempts.	X	X	X
IA-3.	Given a number sentence (with symbols), translate it into a word sentence. Write a correct sentence in at least four out of five attempts.		X	X
IA-4.	Given a set of algebraic terms, simplify using addition or subtraction as indicated by the operational sign. Compute accurately in at least four out of five attempts.		X	X
IA-5.	Given a set of algebraic terms, multiply or divide as indicated by the operational sign. Compute accurately in at least four out of five attempts.		X	X
IA-6.	Translate a given verbal expression into an algebraic expression or sentence. Given an algebraic expression, translate into a verbal expression. Perform the translation accurately in at least four out of five attempts.		X	X
IA-7.	Given an equation or inequality, find the solution set (one and two-step solutions), within the domain of whole numbers. Find the correct solution in at least four out of five attempts.		X	X
IA-8.	Given an equation or inequality, find the solution set (one and two-step solutions), within the domain of integers. Find the correct solution in at least four out of five attempts.		X	X
IA-9.	Given a simple verbal problem, write an appropriate equation, and solve correctly in at least four out of five attempts.		X	X

REAL NUMBERS
(RATIONAL AND IRRATIONAL)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327

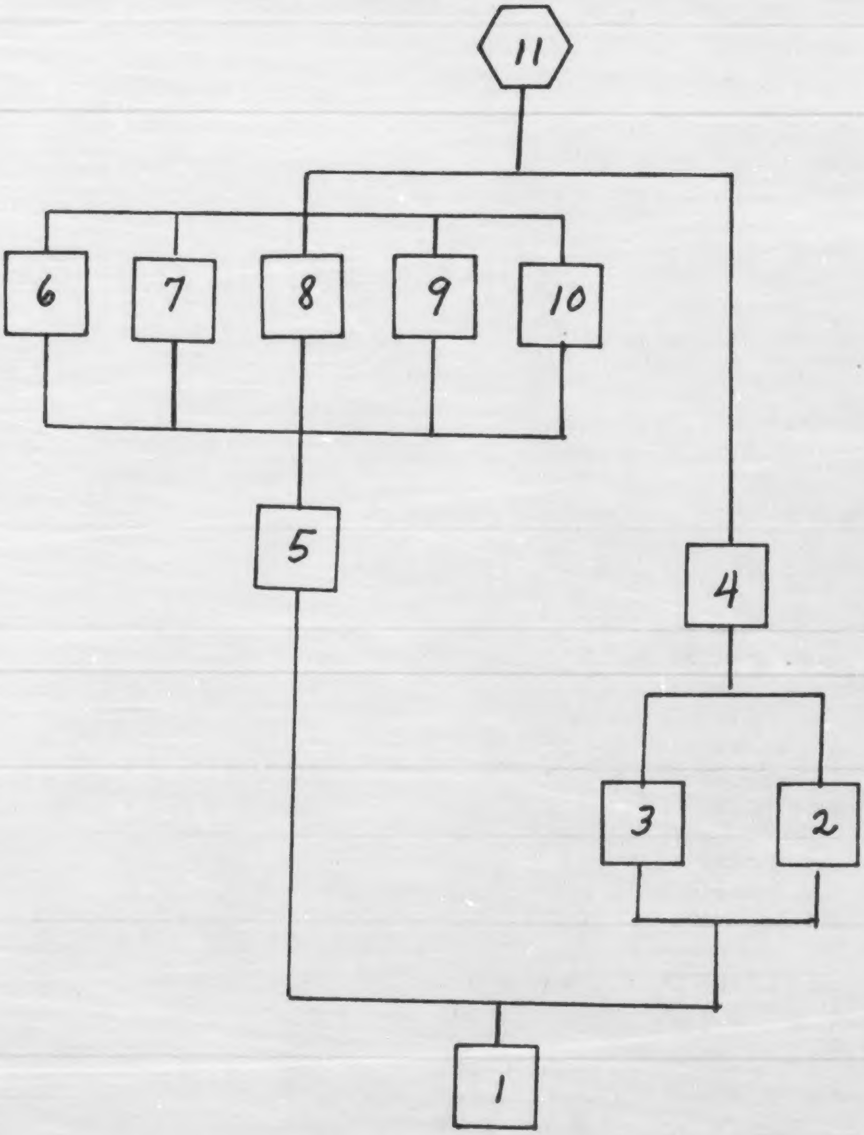
REAL NUMBERS
(Rational and Irrational)

(RN)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
RN-1.	Describe the set of rational and irrational numbers as subsets of the real number system.		X	X
RN-2.	Given a set of rational numbers, arrange them in increasing and decreasing order.		X	X
RN-3.	Given any two rational numbers, illustrate the property of density.		X	X
RN-4.	Name the additive inverse and the reciprocal of a given rational number.		X	X
RN-5.	Name a pair of rational numbers, perform the four basic operations accurately, in at least four out of five attempts.		X	X
RN-6.	Given numbers written in scientific notation, multiply and divide accurately, in at least four out of five attempts.		X	
RN-7.	Given a perfect square number, determine its square root by the use of the tables or by factoring.	X	X	X
RN-8.	Given a number that is not a perfect square, find its approximate square root by using the table or an approximation method.	X	X	X
RN-9.	Given the appropriate dimensions of a right triangle, identify the Pythagorean relationships.		X	X
RN-10.	Given problems which require the use of the Pythagorean relationships, solve them correctly in at least three out of four attempts.		X	X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329

PROBABILITY AND STATISTICS

(PS)

Objectives

The student will be able to:

		LEVEL		
		7	8	9
PS-1.	Given a situation involving probability, determine experimentally all possible outcomes of a single random selection.			X
PS-2.	Given a probability situation, identify the sample space.			X
PS-3.	Determine the ratio that expresses the probability of an event.			X
PS-4.	Given two independent events, determine the probability in at least four out of five attempts.			X
PS-5.	Arrange given numerical data (relatively simple), in tabular form.	X		X
PS-6.	Given a set of data, determine the range, the mean, the median and the mode.	X		X
PS-7.	Interpret a given illustration of a pictograph. Given appropriate data, construct a pictograph.	X		X
PS-8.	Interpret a given illustration of a bar graph. Given appropriate data, construct a bar graph.	X		X
PS-9.	Interpret a given illustration of a line graph. Given appropriate data, construct a line graph.	X		X
PS-10.	Interpret a given circle graph. Given appropriate data, construct a circle graph.	X		X
PS-11.	Given word problems involving probability and statistics, solve correctly at least four out of five.	X		X

PRELIMINARY DRAFT PRELIMINARY DRAFT

COMPETENCY BASED CURRICULUM

OBJECTIVES FOR SCIENCE

GRADES SEVEN THROUGH NINE

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

DR. VINCENT E. REED
SUPERINTENDENT
1978

TABLE OF CONTENTS

Preface..iii
Seventh level Hierarchy.................................. 1
Eighth level Hierarchy................................... 3
Ninth level Hierarchy.................................... 5

Objectives for Communicating............................. 8
    Seventh level
    Eighth level
    Ninth level

Objectives for Measuring................................14
    Seventh level
    Eighth level
    Ninth level

Objectives for Classifying..............................16
    Seventh level
    Eighth level
    Ninth level

Objectives for Formulating Hypotheses...................18
    Seventh level
    Eighth level
    Ninth level

Objectives for Identifying Variables....................20
    Seventh level
    Eighth level
    Ninth level

Objectives for Interpreting Data........................22
    Seventh level
    Eighth level
    Ninth level

Objectives for Experimenting............................24
    Seventh level
    Eighth level
    Ninth level

Appendix..26

PREFACE

The elementary and junior high science hierarchies define objectives that are to serve as a focal point of competency-based instruction. These objectives contribute to the development of specified competencies.

Competencies that constitute scientific literacy are to:

1. IDENTIFY THE KEY IDEAS PRESENTED IN VARIOUS MEDIA.
2. ORGANIZE A BODY OF DATA INTO A STATEMENT WHICH WILL EFFECTIVELY CONVEY THE INFORMATION TO SOMEONE ELSE.
3. IDENTIFY THE VARIABLES IN A SIMPLE, PRACTICAL PROBLEM, AND ESTIMATE THE RELATIVE IMPORTANCE OF EACH VARIABLE.
4. MEASURE LENGTH, MASS, TIME, VOLUME AND TEMPERATURE USING COMMON METRIC UNITS.
5. DEMONSTRATE THE ABILITY TO THINK ANALYTICALLY ABOUT A SITUATION OR SET OF CONDITIONS BY:
    (A) FORMULATING EXPECTED RESULTS BASED ON PREVIOUS EXPERIENCES.
    (B) DESIGNING APPROPRIATE DATA-GATHERING PROCEDURE.
    (C) GATHERING INFORMATION NEEDED TO TEST AN IDEA.
    (D) WRITING LOGICAL STATEMENTS FROM A SET OF RELATED OBSERVATIONS.
6. EXHIBIT POSITIVE AND REALISTIC SELF-CONCEPTS BY:
    (A) INVESTIGATION CAREER OPPORTUNITIES.
    (B) DISCUSSING CRITICALLY ONE'S OWN ABILITIES AND FUTURE PLANS.
7. CITE EVIDENCE OF SCIENTIFIC CHANGES IN SOCIETY THAT EFFECT HUMAN PHYSICAL AND MENTAL WELL-BEING.
8. EXHIBIT COMPETENCY IN APPLYING SCIENTIFIC REASONING TO DECISIONS WHICH MUST BE MADE IN REAL LIFE SITUATION, (E.G., ECONOMIC STABILITY, POPULATION PRESSURES, FAMILY DECISIONS, CAREER DECISIONS).
9. CITE AT LEAST FIVE CONTRIBUTIONS MADE BY MEMBERS OF DIFFERENT ETHNIC GROUPS TO THE SCIENTIFIC AND TECHNOLOGICAL PROGRESS OF OUR SOCIETY AND THE LARGER WORLD SOCIETY.

10. DEMONSTRATE THE ABILITY TO WORK AS A TEAM MEMBER IN A FACT-FINDING SITUATION BY:

    (A) FULFILLING A ROLE IN THE ON-GOING CONDUCT OF AN EXPERIMENT.

    (B) GIVEN RESULTS FROM AN EXPERIMENT, DETERMINING WHICH DATA DOES NOT FOLLOW THE MAJORITY OF DATA.

    (C) DISCUSSING CRITICALLY , POSSIBLE SOURCES OF ERROR IN AN EXPERIMENT.

    (D) COMPARING INFORMATION COLLECTED WITH THAT OF FELLOW STUDENTS.

    (E) SUGGESTING REASONS FOR SUPPORTING OR REJECTING A HYPOTHESIS BASED ON EXPERIMENTAL DATA.

11. CITE THE ROLES OF EXISTING GOVERNMENTAL AGENCIES RESPONSIBLE FOR MONITORING SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT WHICH AFFECT THE CONSUMER IN OUR SOCIETY.

12. DESCRIBE RECENT WORLD-WIDE SCIENTIFIC TECHNOLOGICAL DEVELOPMENTS WHICH HAVE AFFECTED LIVING CONDITIONS AND CITE EVIDENCES OF CHANGES RESULTING FROM SUCH DEVELOPMENTS.

13. GIVEN A LIST OF PURCHASE OPTIONS, COLLECT INFORMATION ON EACH OPTION AND DECIDE WHICH OPTION/S IS/ARE MORE ACCEPTABLE.

14. IDENTIFY HOBBIES AND OTHER LEISURE TIME ACTIVITIES WHICH ARE AVAILABLE TO PEOPLE INTERESTED IN SCIENCE.

Objectives listed in this document are organized into seven strands or unifying themes for levels seven, eight, and nine. Within each strand, the objectives are sequenced in a progressive order of difficulty. The teacher will need to select from each strand those objectives that are appropriate for his or her students. This selection may be based upon dianostic information from the students' previous teacher or from teacher made pre-tests administered before beginning a strand. Instruction should then be planned with attention to dependency relationships and with provision for intergrating skills from the various strands.

It is recognized that the continuous progress framework planned for our schools allows students to proceed through the sequenced set of objectives in accordance with their needs, rates, and learning styles. Therefore, the grade placement for an objective is simply representative of the level at which a learner is likely to be ready for instruction on that objective.

OBJECTIVES FOR JUNIOR HIGH SCIENCE

OVERVIEW OF SCIENCE CONTINUUM

The elementary levels of the science program include experiences in learning the basic science skills of observing, measuring, using space/time relationships, inferring/predicting, communicating, classifying. The content associated with the practice of each skill is designed to acquaint children with everyday phenomena in the immediate environment.

The junior high levels of the curriculum reinforce the basic skills and synthesize them into the more sophisticated behaviors of communicating, measuring, classifying, formulating, hypotheses, identifying variables, interpreting data, and experimenting.

This K-9 hierarchy is designed to equip students with a basic knowledge of the nature of the scientific enterprise and how science skills can be applied to everyday situations.

The senior high program will begin with a Laboratory Science Course designed to replace the present physical science course and continue with electives in the physical and biological sciences. Each course will have a set of objectives and criteria for success established. Only very preliminary work has been done on these courses.

The elementary and junior high hierarchies are divided into primary, intermediate and three junior high levels.

ACKNOWLEDGEMENTS

The Objectives for Junior High Science publication is being prepared under the direction of Mary Harbeck by the following teachers:

Leroy Rollins - Hine Junior High School
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Pattie Spady - Jefferson Junior High School
Roslyn Wall - Rabaut Junior High School
James Whitby - Resident Curriculum Writer
Olivia Swinton - Friendship Educational Center

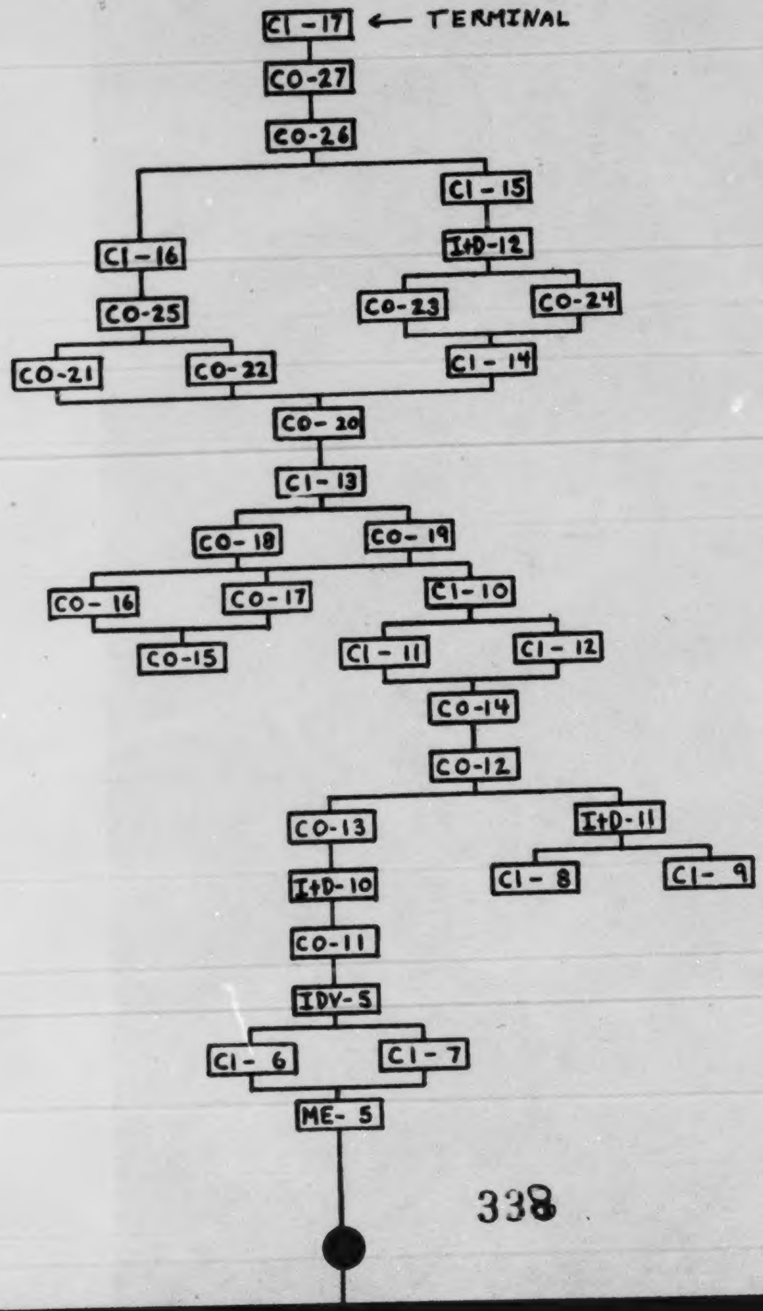
This manuscript was typed by Carole Wallace.

AN INVITATION

This publication is incomplete and still under development. Teachers and students are invited to submit ideas for objectives, activities, and assessment tasks. If you have written an appropriate instructional system, please share it with us so that your contributions can be considered for inclusion in the next working draft.

HIERARCHIES
FOR
SEVENTH
EIGHTH
NINTH
LEVELS

HIERARCHY
JUNIOR HIGH
SEVENTH LEVEL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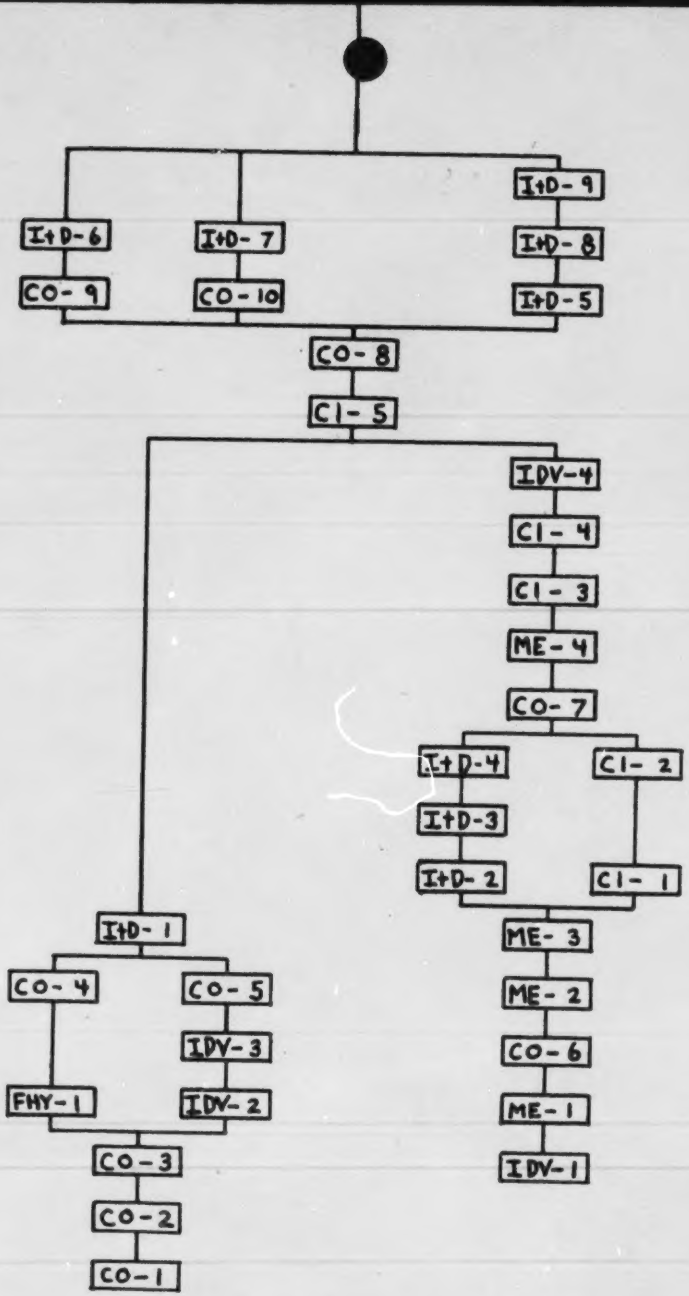
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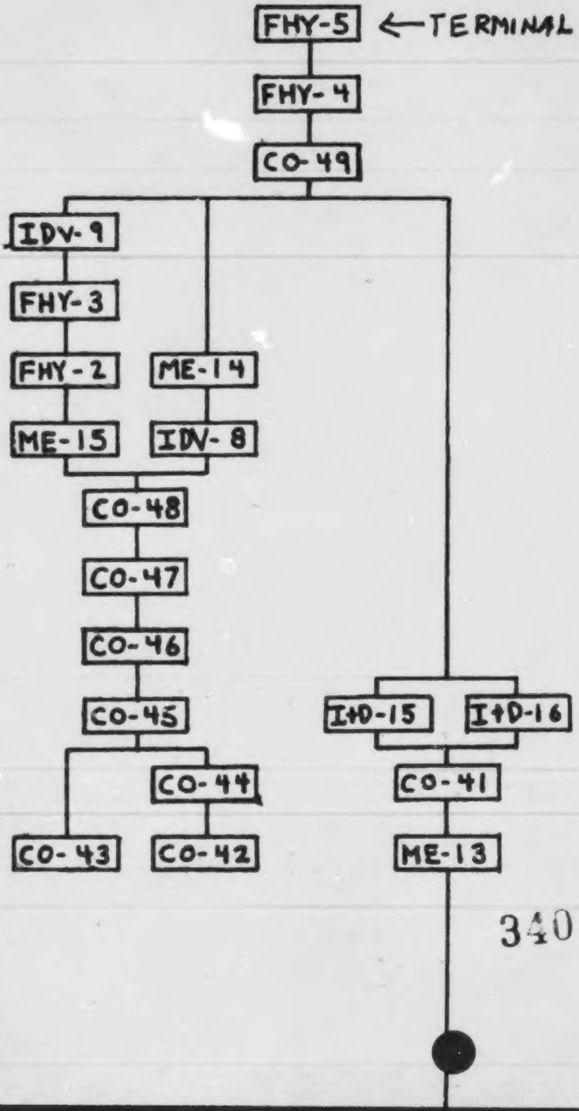
HIERARCHY
JUNIOR HIGH
EIGHTH LEVEL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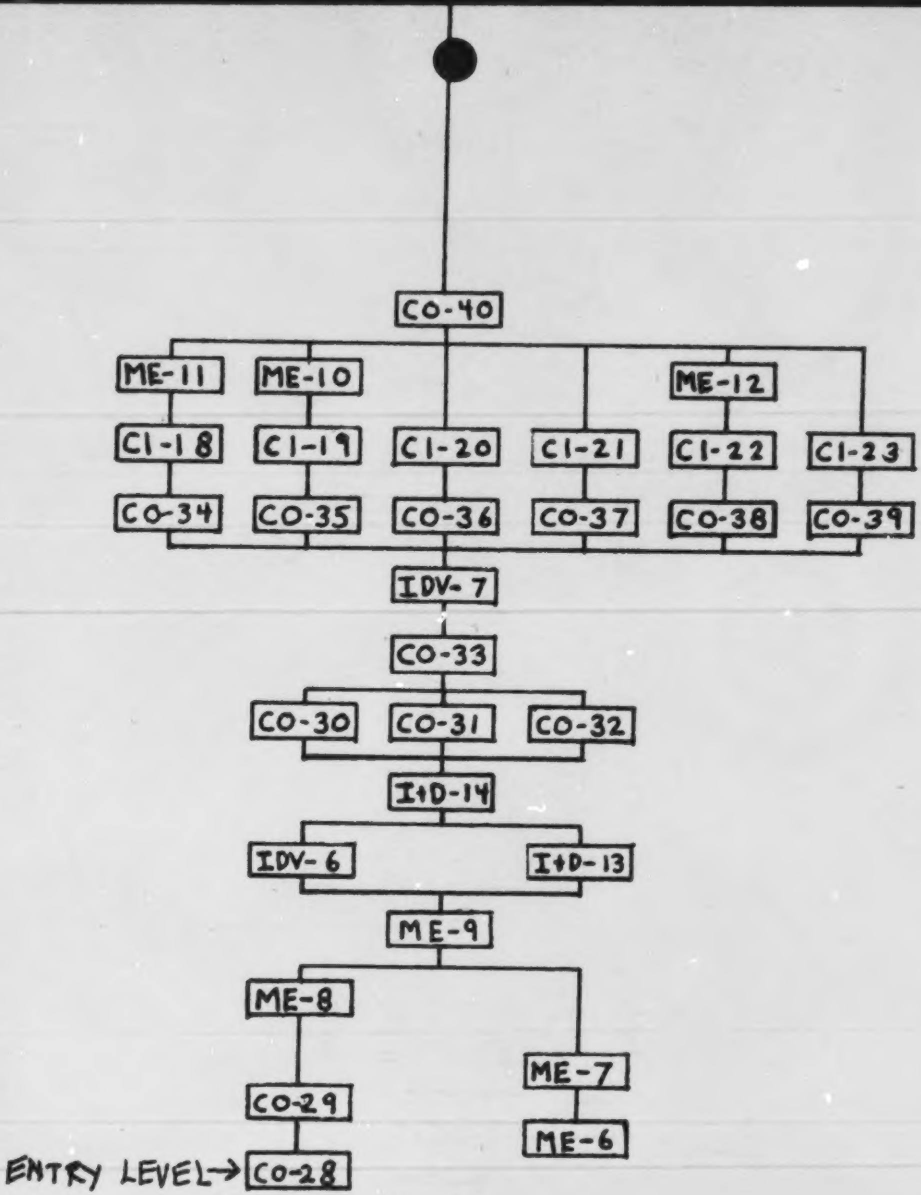
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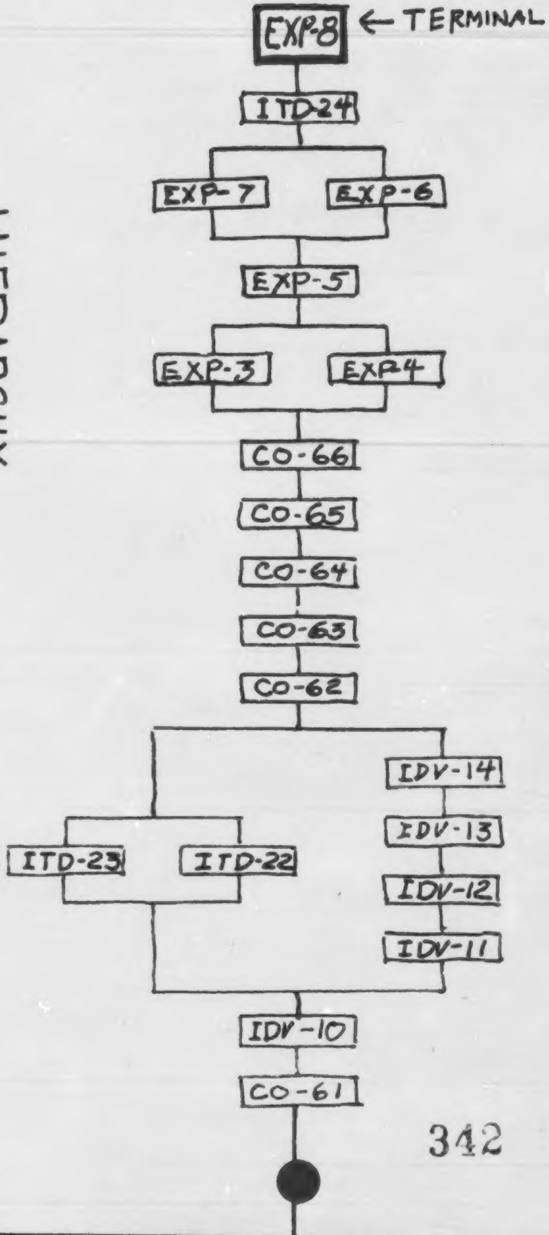
ENTRY LEVEL→
CO-28

HIERARCHY
JUNIOR HIGH
NINTH LEVEL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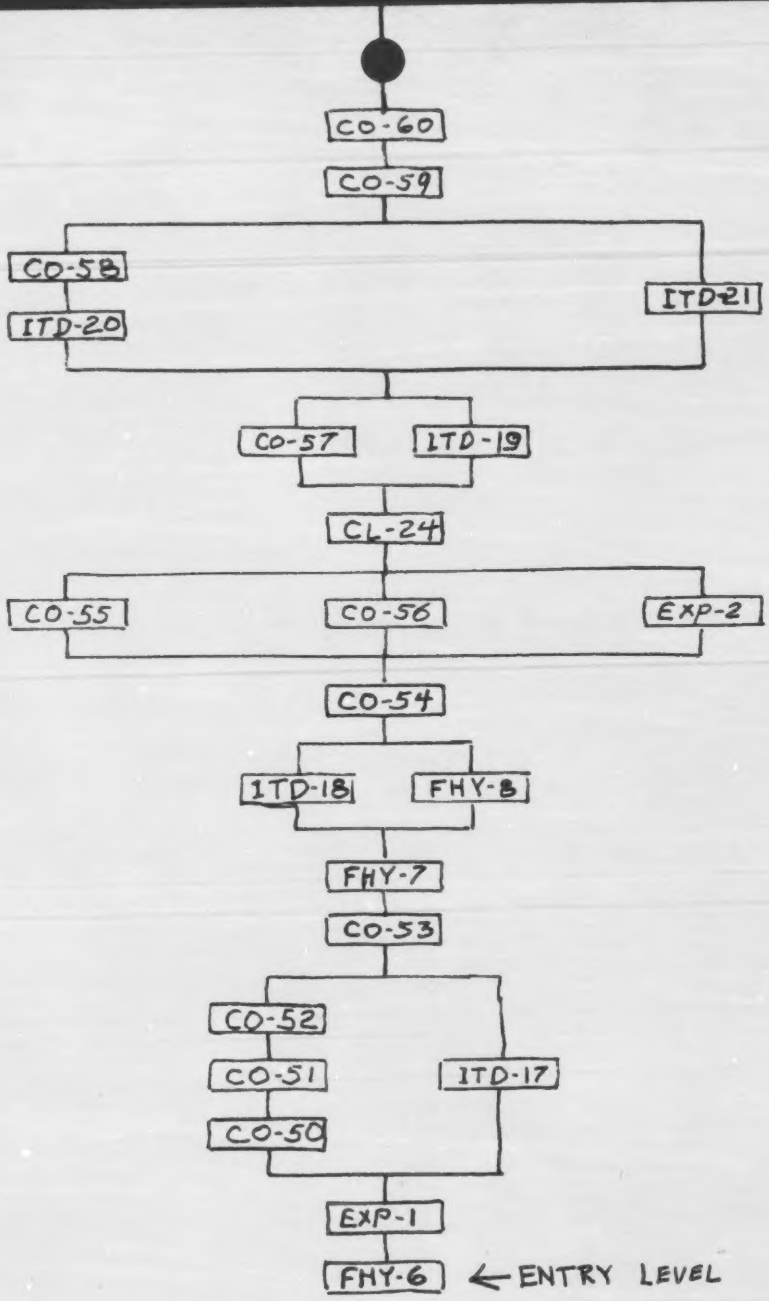
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FHY-7
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CO-52
CO-51
CO-50
ITD-17
EXP-1
FHY-6
← ENTRY LEVEL

OBJECTIVES FOR COMMUNICATING

SEVENTH LEVEL

CO-1 The student will be able to name ten specialized science fields.

CO-2 The student will be able to name ten science careers.

CO-3 The student will be able to describe the word "science" as being an organized body of knowledge based on experimentation.

CO-4 The student will be able to order the stages of an experiment.

CO-5 The student will be able to order data in sequence.

CO-6 The student will be able to describe a given sample of matter in terms of its volume and weight.

CO-7 The student will be able to describe physical changes in matter in terms of the atomic and molecular theories of matter.

CO-8 The student will be able to name various forms of precipitation.

CO-9 The student will be able to describe the effect of air temperature changes on condensation rate when given the temperature changes.

CO-10 The student will be able to construct a model of the water cycle with one form of precipitation.

CO-11 The student will be able to describe ten ways that weather affects man in his environment.

CO-12 The student will be able to describe the ways in which natural agents have affected the shape of the earth's crust.

CO-13 The student will be able to describe features of the earth formed by the movement of matter within the earth.

CO-14 The student will be able to describe the function of certain cell structures.

CO-15 The student will be able to identify seven characteristics common to living things.

CO-16 The student will be able to identify and give examples of living things responding to environmental stimuli.

CO-17 The student will be able to describe the adaptations of living things to their environment.

CO-18 The student will be able to describe the main characteristics of the plant phyla.

CO-19 The student will be able to describe the main characteristics of the animal phyla.

CO-20 The student will be able to describe the diversity, the interdependence and the classification of living things.

CO-21 The student will be able to describe the process of photosynthesis in green plants.

CO-22 The student will be able to describe the function of the fruit and flower of a seed plant.

CO-23 The student will be able to describe the reproductive processes of two higher forms of animal life such as the grasshopper and the frog.

CO-24 The student will be able to describe the different methods of reproduction such as fission, regeneration and fertilization in different kinds of animals.

CO-25 The student will be able to describe the different methods of reproduction such as fission, budding, vegetative reproduction, spore formation, and fertilization in different kinds of plants.

CO-26 The student will be able to describe how a given type of reproduction in animals compares to that of plants.

CO-27 The student will be able to describe how living things reproduce and perpetuate their species.

OBJECTIVES FOR COMMUNICATING

EIGHTH LEVEL

CO-28 The student will be able to describe static electricity, alternating and direct electrical current in terms of methods of production and electron movement.

CO-29 Given the names or descriptions of various electrical components, the student will be able to correctly name the symbols commonly used to represent each.

CO-30 The student will be able to describe heat transfer by conduction in terms of the form of matter and situations which facilitate this type of heat energy transfer.

CO-31 The student will be able to describe heat transfer by convection in terms of the forms of matter and situations which facilitate this type of heat energy transfer.

CO-32 The student will be able to describe heat transfer by radiation in terms of how it is affected by various types of matter.

CO-33 The student will be able to describe heat transfer into or out of a house by conduction, convection and radiation.

CO-34 The student will be able to describe the lever in terms of the characteristics of its three classes and at least three of its uses.

CO-35 The student will be able to describe the inclined plane in terms of its shape, general advantages and at least three uses.

CO-36 The student will be able to describe the wedge in terms of its shape, practical uses and factors that influence its performance.

CO-37 The student will be able to describe the screw in terms of its shape, relationship to the inclined plane and at least three of its uses.

CO-38 The student will be able to describe the wheel and axle in terms of its general shape and at least three of its uses.

CO-39 The student will be able to describe the pulley in terms of its general shape, and at least three of its uses.

CO-40 The student will be able to describe which simple machine is appropriate to be used for tasks common to daily life.

CO-41 The student will be able to describe the three major fossil fuels used in the United States today in terms of availability, methods of storage, methods of transport and raw form.

CO-42 The student will be able to describe correctly the compression and rarefaction components of sound waves.

CO-43 The student will be able to describe correctly the conditions which permit the human ear to detect echoes.

CO-44 The student will be able to describe the parts of a telephone receiver in terms of their function and shape.

CO-45 The student will be able to describe the use of the electromagnet in an electric bell in terms of its structure and function.

CO-46 The student will be able to describe the way a telephone transmitter transforms sound waves into electronic waves to send messages.

CO-47 The student will be able to describe the ways that wires are used to carry messages.

CO-48 The student will be able to describe a telegraph key and explain how it is used to send messages using the morse code.

CO-49 The student will be able to describe how three common devices are used to convert electrical energy to heat, light, sound and mechanical energy.

OBJECTIVES FOR COMMUNICATING

NINTH LEVEL

CO-50 The student will be able to construct an elliptical shape.

CO-51 The student will be able to describe ways to show that the earth's distance from the sun and its orbital speed change as the earth moves around the sun in an elliptical path.

CO-52 The student will be able to describe the standard time zones in the United States, in terms of their differences and effects upon the people living within them.

CO-53 The student will be able to describe the difference between an action and a reaction force.

CO-54 The student will be able to construct a model of the earth's position in space in relation to the other heavenly bodies of the universe.

CO-55 The student will be able to name the three types of bacteria according to the shape of the bacteria.

CO-56 The student will be able to describe at least three conditions necessary for bacterial growth.

CO-57 The student will be able to describe at least three diseases that are caused by bacteria and list ways of controlling these diseases.

CO-58 Given the names of scientists, the student will be able to describe their methods of controlling certain viral diseases.

CO-59 The student will be able to describe how diseases can be controlled through the use of antibiotics, disinfectants, and other drugs.

CO-60 The student will be able to describe how a person can have immunity or acquire immunity to some diseases.

CO-61 The student will be able to describe diseases caused by the lack of necessary vitamins such as vitamins A,B,C,D and K.

CO-62 The student will be able to construct a menu for a day, which includes foods containing each of the six required nutrients.

CO-63 The student will be able to describe a well balanced diet in terms of the foods that best provide the six required nutrients as well as the importance of including these nutrients in one's diet.

CO-64 The student will be able to name the substances represented by a list of chemical formulas or equations.

CO-65 The student will be able to describe the chemical composition of chemical substances found in medicine chests and kitchens in terms of the elements present in these substances.

CO-66 The student will be able to construct a chemical equation to explain the Law of Conservation of Mass.

OBJECTIVES FOR MEASURING

SEVENTH LEVEL

ME-1 Given a graduate cylinder and a diagram of it, the student will demonstrate the ability to measure the volume of liquid.

ME-2 The student will be able to describe density as being the mass of an object divided by its volume.

ME-3 Given the formulas $D=\frac{m}{V}$ and V=LWH, the student will demonstrate the ability to find the density of a solid object by measuring its dimensions and mass.

ME-4 The student will be able to state the law regarding the conservation of matter.

ME-5 The student will be able to demonstrate the ability to measure weather conditions using the barometer, hygrometer, anemometer, rain guage and wind vane.

EIGHTH LEVEL

ME-6 Given information about an electrical load, the student will be able to apply the rule to compute the power in watts consumed by the electrical load.

ME-7 Given a kilowatt hour meter, the student will be able to demonstrate the ability to correctly read the meter.

ME-8 Given a circuit diagram, the student will be able to demonstrate the correct way of attaching a volt meter and ammeter to measure voltage and direct current flow through an electrical circuit.

ME-9 Given information aboutan energy source, and various power consuming items attached to it, the student will be able to apply a rule to correctly determine whether or not the circuit is overloaded.

ME-10 Given information about the force and distance associated with an inclined plane in use, the student will be able to apply the rule used to compute the amount of force needed to move an object up an inclined plane.

ME-11 Given information about the input and output forces or distances associated with a lever in action, the student will be able to apply the rule used to determine the mechanical advantage of a lever.

ME-12 Given information about the forces and distances associated with a wheel and axle in action, the student will be able to apply the rule used to compute the force needed to move an object using a wheel and axle.

ME-13 Given data about an object in motion, the student will be able to demonstrate the ability to compute the time, speed or distance traveled if any two of the values are given.

ME-14 Given a set of problems involving the movement of sound waves, the student will be able to apply the rule to compute the distance or time of travel in all of the problems.

ME-15 By measuring the angles of incidence and reflection, the student will be able to demonstrate the fact that these two angles are equal.

351

OBJECTIVES FOR CLASSIFYING

SEVENTH LEVEL

CL-1 The student will be able to distinguish between molecules and atoms.

CL-2 Given a list of elements, the student will be able to describe how they are joined together to form compounds.

CL-3 The student will be able to distinquish between elements, compounds, and mixtures when given examples of each.

CL-4 When given examples of each, the student will be able to describe the use of symbols and formulas to represent elements and compounds.

CL-5 Given examples of different objects, the student will be able to describe the observable physical properties of the objects and relate their properties to their uses.

CL-6 Given the names of different clouds, the student will be able to distinquish each in terms of altitude and appearance.

CL-7 The student will be able to describe the layers of the atmosphere in terms of their height and content.

CL-8 The student will be able to demonstrate the ability to use a classification system to group rocks into the three main classes.

CL-9 The student will be able to construct a classification system based on a given property of soil.

CL-10 The student will be able to distinquish between a cell, tissue, organ and organ system.

CL-11 The student will be able to identify microscopic organisms such as bacteria, amoebae and fungi.

CL-12 The student will be able to identify similarities and differences in plant and animal cells.

CL-13 The student will be able to distinquish between the plant and animal kingdom as to similarities and differences.

CL-14 The student will be able to identify similarities and differences in animal anatomy by comparing the circulatory systems of two higher forms of animal life.

CL-15 The student will be able to describe the life cycle of two different forms of animal life.

CL-16 The student will be able to distinguish various types of plant life.

CL-17 The student will be able to construct a classification system for classifying parts of the earth based upon their ability to support three different kinds of animal life.

EIGHTH LEVEL

CL-18 Given the names of different objects the student will be able to distinguish all of the objects which incorporate levers.

CL-19 Given the names of different objects, the student will be able to distinguish those objects which are inclined planes.

CL-20 Given the names of different objects, the student will be able to distinguish those objects which incorporate the wedge.

CL-21 Given the names of different objects, the student will be able to distinguish those objects which are screws.

Cl-22 Given the names of different objects, the student will be able to distinguish those objects which incorporate the wheel and axle.

CL-23 Given the names of different objects, the student will be able to distinguish those which incorporate the pulley.

NINTH LEVEL

CL-24 The student will be able to distinguish between one colony of bacteria and another by classifying the colonies according to their color, shape and texture.

OBJECTIVES FOR FORMULATING HYPOTHESES

SEVENTH LEVEL

FHY-1 The student will be able to construct a hypothesis when presented with a problem.

EIGHTH LEVEL

FHY-2 The student will be able to describe situations which can be used to show how the angle of incidence is related to the angle of reflection.

FHY-3 The student will be able to describe the conditions which cause the refraction of light.

FHY-4 The student will be able to describe three factors which contribute to the energy crisis today.

FHY-5 The student will be able to describe three methods of minimizing fuel shortages in the future.

NINTH LEVEL

FHY-6 The student will be able to describe evidence that the earth revolves around the sun.

FHY-7 The student will be able to describe how a rocket in motion is guided through a trajectory.

FHY-8 The student will be able to describe one condition on each planet (other than earth) that makes the planet unable to support life.

OBJECTIVES FOR IDENTIFYING VARIABLES

SEVENTH LEVEL

IDV-1 When given a group of substances, the student will be able to describe them as solids, liquids, or gases.

IDV-2 When given an experimental situation, the student will be able to identify the variables which could change the results of the experiment.

IDV-3 The student will be able to identify the manipulated variable and the controlled variable while planning a testing procedure.

IDV-4 Given a chemical change the student will be able to describe the chemical equation which represents that change.

IDV-5 The student will be able to describe the variables that influence a hurricane.

EIGHTH LEVEL

IDV-6 The student will be able to describe the factors that affect the magnetic field produced by an electric current flowing through a wire.

IDV-7 The student will be able to describe the ways that heat transfer into or out of a house can be controlled.

IDV-8 The student will be able to demonstrate the ability to generate sounds that vary in both amplitude and pitch.

IDV-9 The student will be able to apply the rules governing the reflection of light while solving common problems.

NINTH LEVEL

IDV-10 The student will be able to identify three foods that contains each of the necessary vitamins(A,B,C,D and K).

IDV-11 The student will be able to demonstrate the procedure used to show the presence of starch in foods and explain the importance of starch in the daily diet.

IDV-12 The student will be able to demonstrate the procedure for detecting sugars in foods and explain the importance of sugar in one's daily diet.

IDV-13 The student will be able to demonstrate the procedure for determining proteins in foods and explain the importance of proteins in the daily diet.

NINTH LEVEL

IDV-14 The student will be able to demonstrate the procedure for determining fats in foods and explain their importance in our daily nutrition.

OBJECTIVES FOR INTERPRETING DATA

SEVENTH LEVEL

ItD-1 The student will be able to construct conclusions based on a given set of data.

ItD-2 The student will be able to describe the process of sublimation after observing this in an experiment.

ItD-3 The student will be able to describe density and buoyancy as characteristics of matter.

ItD-4 The student will be able to describe Archimedes' principle and the characteristics of buoyancy when given a diagram of a floating object or an arrangement of floating objects.

ItD-5 The student will be able to distinguish the various symbols used on a weather map.

ItD-6 The student will be able to describe at least three ways that air pollution affects living things.

ItD-7 The student will be able to describe two ways changes in the weather affect the water table.

ItD-8 The student will be able to describe winds in terms of speed and direction.

ItD-9 The student will be able to describe how changes in air temperature affect barametic readings.

ItD-10 The student will be able to describe the effects of erosion and weathering in his environment.

ItD-11 When given five mineral samples, the student will be able to order the minerals according to hardness.

ItD-12 The student will be able to describe complete and incomplete metamorphosis and give examples of each.

EIGHTH LEVEL

ItD-13 The student will be able to describe the effects of a magnet on a coil of wire.

ItD-14 The student will be able to describe the factors which determine the strength of an electromagnet.

ItD-15 The student will be able to order five major fuels used today in the United States according to their yearly rates of consumption.

EIGHTH LEVEL

ItD-16 The student will be able to order five major fuels used today in the United States according to their availability.

NINTH LEVEL

ItD-17 The student will be able to describe given instruments such as the telescope, spectroscope, and satellites, used to obtain information from the sun and stars in terms of the types of data they provide.

ItD-18 When given the name of a satellite program, the student will be able to describe at least three benefits that modern life has derived from that program.

ItD-19 The student will be able to describe the effects that certain factors have upon the rate of bacterial growth.

ItD-20 The student will be able to describe a virus and explain why viruses are so difficult to control.

ItD-21 The student will be able to describe the life cycle of the Plasmodium parasite and explain how this parasite is transmitted to man.

ItD-22 The student will be able to describe ,by listing and discussing,three minerals that are required for maintaining a healthy body.

ItD-23 The student will be able to describe why water is such an important item in the daily diet and predict what would happen to the body without sufficient water.

ItD-24 The student will be able to describe how chemical knowledge is used to produce valuable substances.

OBJECTIVES FOR EXPERIMENTING

SEVENTH LEVEL

None.

EIGHTH LEVEL

None.

NINTH LEVEL

EXP-1 The student will be able to demonstrate that the causes of the earth's four seasons in the northern and southern hemisphere are the result of movement of the earth around the sun in an elliptical orbit and the earth's 23½° tilt on its axis.

EXP-2 The student will be able to demonstrate the ability to show that bacteria is present in the air, on the human body and in the classroom.

EXP-3 The student will be able to demonstrate that water is purified when it is separated from other materials.

EXP-4 The student will be able to describe at least three solvents in terms of solutes that can be dissolved by each after performing the required experiments to determine this information.

EXP-5 The student will be able to describe the properties of soap and synthetic detergents.

EXP-6 The student will be able to describe some methods for determining the types of plastics we use and the difference between synthetic and natural fibers.

EXP-7 When given the necessary recipe, the student will be able to describe the procedure used to produce several cosmetic products such as hand lotion, bubble bath and after shave lotion.

EXP-8 The student will be able to demonstrate the ability to determine the effectiveness of several pharmaceutical products, after performing the laboratory work.

APPENDIX

GLOSSARY OF TERMS*

Action Words

The following terms are used to designate observable behaviors which, when exhibited by students give evidence that the requested tasks have been successfully performed.

1. Construct	To make a physical object, a drawing or a written or verbal statement (such as an inference, hypothesis, or a test of any of these.)
2. Demonstrate	To perform a sequence of operations necessary to carry out a procedure.
3. Describe	To state observable properties sufficient to identify an object, event, or relationship.
4. Distinguish	To select an object or an event from two or more which might be confused.
5. Identify	To select a named or described object by pointing to it, touching it, or picking it up.
6. Name	To specify what an object, event, or relationship is called.
7. Order	To arrange three or more objects or events in a sequence based on a stated property.
8. Apply a Rule	To derive an answer to a problem by using a stated relationship or pinciple.
9. State a Rule	To communicate, verbally or in writing, a relationship or principle that could be used to solve a problem or perform a task.

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*The definitions for action words and the processes of science are quoted, with permission, from Guide for Inservice Instruction, Science...A Process Approach Program published by the American Association for the Advancement of Science, Miscellaneous Publication 67-9, Washington, D.C., 1967

PROCESSES (SKILLS) OF SCIENCE

In science a strong emphasis is placed on developing the ability of students to employ the processes of science to learn about the natural phenomena around them. These same processes are used by scientists in pursuing their own investigations. Many of the processes are useful in other areas of study and in everyday life.

Students develop facility with the basic processes in the early grades, and move on to the more complex integrated processes in grades four through nine. In the laboratory science course the integrated skills are synthesized into a set of investigative practices which can be used in the life-long pursuit of solutions to problems.

Basic Processes

1. Observing - Using several or all of the senses...sight, touch, hearing, taste, and smell...to find out about an object. (Note: Unknown objects should not be tasted.) Quantitative (measured) observations are more precise than qualitative observations.

2. Inferring - Making an interpretation of an observation. If it is observed that a pond is frozen then we infer that the water temperature is below 0° degrees centigrade. (Celsius)

3. Using Space/Time Relationships - Being able to describe the physical environment in terms of spatial relationships and changes with time. This includes shapes, symmetry, motion, rate of change in position, direction of change in position, and the measuring of time intervals.

4. Measuring - Choosing an appropriate measuring instrument, using it properly, recording the readings and carrying out calculations with the resulting data.

5. Communicating - To transfer information to someone else by means of oral and written words, diagrams, maps, graphs, mathematical equations, and visual demonstrations.

6. Classifying - To impose order on collections of objects or events. Biologists classify living things as plants or animals. Classification systems are used in everyday life for filing systems, telephone listings (classified ads), and personal activities such as shopping lists.

7. Predicting - Making a specific forecast of what future observations will be. Predictions are based on observations and inferences already made. For this reason they are different from making a guess.

Integrated Processes

1. Formulating Hypotheses - Hypotheses are statements of generalizations that include all objects or events of the same class. They are always based on observations or inferences. If it is observed that a dog sheds hair in the spring of the year, the generalization might be that all hair-covered animals shed in the spring. This generalization (hypothesis) could be tested by observing as many other animals as possible.

2. Controlling Variables - When scientists conduct investigations or test hypotheses, they first identify all the variables they can and then design a procedure to control each variable. To get good evidence they manipulate in an orderly way the variable stated in the hypothesis and watch for corresponding changes in another variable called the responding variable. All other variables are held constant insofar as is possible.

3. Interpreting Data - This is a process useful in nearly all activities. The reading of books, newspapers, charts, graphs, maps, and pictures requires us to interpret. The attempt to find the meaning in data, in whatever form we collect it, leads to the construction of inferences, predictions, and hypotheses.

4. Defining Operationally - To state the meaning of a term in the context of one's own experience. The definition should state "what you do" and "what you observe" in the physical sciences. In life science the definitions are usually descriptive. These definitions are more useful to scientists and children than those in a dictionary. To define "mouse" as the tiny grey animal with fur and beady eyes that crawls through a hole in the wall may be more useful to children than saying that it is a small member of the genus Mus in the rodent family.

5. Experimenting - This is the cumulative process that includes all the other processes. To do an experiment it is necessary to make some observations, formulate a hypothesis, identify the variables which are present, decide which one is to be manipulated, construct a test with the other variables controlled, collect and interpret the data, and decide whether the hypothesis is to be supported or rejected.

PRELIMINARY DRAFT PRELIMINARY DRAFT

COMPETENCY BASED CURRICULUM

ENGLISH

SCOPE AND SEQUENCE

GRADES 10 THROUGH 12

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

DR. VINCENT E. REED
SUPERINTENDENT
1978

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TABLE OF CONTENTS

PAGE

Preface i

Statement of Philosophy iv

Scope and Sequence

Writing

Grammar 1

Usage 3

Punctuation, Spelling, Capitalization 4

Composition 5

Formal Paper 7

Research Paper 8

Speaking 9

Everyday Speaking 10

Presentations 11

Formal Discussion 12

Group Dynamics 13

Listening 14

Language Development 16

Significant Changes 17

Vocabulary 18

Word Analysis 19

PAGE

Literature 20

Fiction and Drama 22

Poetry 24

Essay 25

Biography and Autobiography 26

Study Skills 27

Study Skill Strategies 28

References 29

Test-taking 30

Media Analysis 31

PREFACE

This draft of the Senior High English Scope and Sequence identifies objectives which will assist in the implementation of a competency-based approach to instruction in the D. C. Public Schools. The purpose of this listing is to serve as a guide for teachers. It indicates skills and behaviors that students are to attain, and it provides guidelines for tailoring instructional activities and assessment items which will accommodate the needs, learning rates, and styles of the individual student.

For this publication, six broad skills categories have been defined: Writing, Speaking, Listening, Literature, Language Development, and Media Analysis. In each category, the objectives have been arranged from the least difficult to the most complex. The teacher will need to select from each category those objectives that are most appropriate for meeting the needs of the student, to establish the dependency relationships among the objectives, and to integrate skills from the various categories.

Among the basic assumptions about a competency-based approach to instruction are the requirements that there will be a continuous progress framework and that there will be mastery of identified skills.

Therefore, this listing of objectives includes grade levels, at which emphasis should be placed on the attainment of certain skills. However, teachers are cautioned to view the grade level placements as being simply guides allowing students to move up or down the continuum as dictated by the needs of the individual student. The symbol "x" to indicate grade placement is provided only to suggest the point at which the greatest emphasis should be placed, as many of these skills have been introduced as early as first grade. It is expected that at each grade level the teacher will help each student reach his highest potential.

To establish the readiness or entry level for instruction on a set of objectives, the teacher should pre-test to verify the need, using the mode of assessment that seems most appropriate.

With the expectation that students will attain mastery of skills fundamental to the subject area, the curriculum committee has attempted to identify essential objectives to be achieved before high school graduation. The committee invites the English teachers of the D. C. Public School System to examine and comment on the minimum essentials designated in this listing, and cautions teachers that in no instance are students to be limited to the minimum expectation.

The ultimate aim for this listing of objectives is that students will attain the **following skills**:

WRITING

Apply writing skills appropriate to social, career, and citizenship roles.

SPEAKING/LISTENING

Demonstrate the ability to apply listening and speaking skills effectively in various life situations.

LANGUAGE DEVELOPMENT

Demonstrate the development of a functional vocabulary adequate to receive and convey ideas of varying degrees of complexity.

LITERATURE

Respond to literature as art and develop increased insight into the human conditions.

STUDY SKILLS

Demonstrate study skill strategies to increase knowledge and improve efficiency.

MEDIA ANALYSIS

Analyze the impact of mass media on society.

STATEMENT OF PHILOSOPHY

The senior high school English language arts curriculum seeks to provide the frame work for a balanced approach to the development of communication skills in the broad divisions of reading, writing, speaking, and listening, with a particular focus on language development, composition, and literature. Recognizing the value and inseparability of the cognitive and affective domains, the curriculum developers seek balance between the development of skills and the acquisition of understandings, attitudes, and values.

Personal abilities and teaching styles differ; therefore, teachers must determine how their own competencies, knowledge, interests, and abilities best combine in the classroom so that the ultimate focus is the individual student. In order that maximum benefits will accrue to the student, the curriculum development effort has been based on the following beliefs:

- that the curriculum should be structured to encourage in students the development of positive self-images and a recognition of their uniqueness as individuals.
- that the curriculum should provide opportunities for students to develop those competencies in reading, writing, speaking, and listening which will enable them to experience a sense of accomplishment and will contribute to their success in life roles.

- that the scope and sequence of the curriculum should accommodate the individual learning rates and styles of students and provide for alternative learning and teaching modes.
- that the curriculum should develop those skills and knowledge which will enable students to become independent learners by actively involving the student in both the learning and evaluation processes.
- that the curriculum should challenge and reinforce the creative and imaginative impulses of the student and the teacher.
- that the curriculum should help the student acquire a set of values, ideals, and aesthetic appreciations which will enable them to function as morally and socially responsible human beings in a democratic society.
- that the curriculum should heighten the students' empathy and tolerance for others and help them recognize and respect the uniqueness of other national and cultural groups.
- that the curriculum should provide opportunities for students to gain analytical skills which will enable them to think critically and make independent judgments.
- that the curriculum should expand the students' knowledge and understanding of universal themes and the human conditions.

- that the curriculum should respect the student's own dialect while giving him/her facility in the use of the standard dialect, and should stress "appropriateness" of language for the given occasion.
- that the curriculum should recognize the importance of literacy in the non-print media.
- that the curriculum must be tentative, flexible, and responsive to the results of continual evaluation.

373

ENGLISH

COMPETENCY AREA: Writing-Grammar

TERMINAL OBJECTIVE: Apply the standard rules of grammar in the construction of sentences.

The student will:	10	11	12
1. Identify parts of speech by making a distinction between form class words and structure words.	x		
* 2. Identify simple and complete subjects, verbs, and complements.	x		
3. Construct sentences containing subjects, verbs, and complements.			
* 4. Distinguish among the four types of sentences - declarative, interrogative, imperative, and exclamatory.	x		
5. Construct the four types of sentences according to purpose.	x		
6. Distinguish between phrases and clauses.	x		
* 7. Construct sentences containing phrases and clauses.	x		
8. Distinguish among the four kinds of sentences according to structure simple, compound, complex, compound complex.	x		
* 9. Distinguish complete sentences from fragments and run-on sentences.	x		

ENGLISH

COMPETENCY AREA: Writing-Grammar

TERMINAL OBJECTIVE: Apply the standard rules of grammar in the construction of sentences.

The student will:	10	11	12
10. Expand ideas in sentences by using clauses and phrases.		x	
11. Reduce sentences to achieve sentence variety and to avoid wordiness.		x	
*12. Construct sentences using a variety of sentence structure.		x	
13. Apply the standard rules of grammar in the construction of sentences.		x	

ENGLISH

COMPETENCY AREA: Writing-Usage

TERMINAL OBJECTIVE: Apply the rules of standard English usage in written work.

The student will:	10	11	12
*1. Distinguish between standard and non-standard English.	x		
*2. Use standard English to fit formal and informal situations.	x		
*3. Apply the rules governing the singular and plural forms of words.	x		
*4. Demonstrate proper use of regular and irregular verbs.	x		
*5. Apply the appropriate rule for the agreement of subject and verb in person and number.	x		
*6. Apply the appropriate rule for the agreement of pronoun with its antecedent in number and gender.	x		
*7. Apply the rule of pronoun case usage.	x		
*8. Apply the rules for the correct use of modifiers.	x		
*9. Apply the rules of standard English usage in written work.	x		

ENGLISH

COMPETENCY AREA: Writing- Punctuation, Spelling, Capitalization

TERMINAL OBJECTIVE: Apply the rules of punctuation, spelling, and capitalization in written work.

The student will:	10	11	12
*1. Demonstrate the proper use of the period, question mark, exclamation point, comma, apostrophe, underlining and semi-colon.	x		
2. Demonstrate the proper use of the quotation mark, hyphen, bracket, parenthesis, dash, caret, colon and ellipsis.		x	
*3. Apply the standard rules of spelling.	x		
*4. Demonstrate mastery of frequently misspelled words.	x		
*5. Demonstrate correct use of capital letters.	x		
6. Apply the rules of punctuation, spelling, and capitalization in written work.	x		

ENGLISH

COMPETENCY AREA: Writing-Composition

TERMINAL OBJECTIVE: Demonstrate skill in using composition techniques.

The student will:	10	11	12
1. Apply the principles of word economy to write sentences.			x
* 2. Apply the principles of clear reference of pronoun with antecedent.	x		
* 3. Demonstrate the ability to construct sentences free of unnecessary shifts in subject and verb forms.		x	
4. Apply the principle of modifier placement to construct clear sentences.			
5. Apply the principle of parallelism to construct clear sentences.			
6. Apply the principle of coordination to show exact relationship between ideas in sentences.		x	
7. Apply the principle of subordination to clarify the importance of ideas in a sentence.		x	
8. Identify and describe the function of the topic sentence.	x		
* 9. Construct topic sentences.	x		
10. Identify supporting sentences.	x		
11. Identify methods of supporting topic sentences.	x		
*12. Construct supporting sentences.	x		

ENGLISH

COMPETENCY AREA: Writing-Composition

TERMINAL OBJECTIVE: Demonstrate skill in using composition techniques.

The student will:

		10	11	12
13.	Apply the principles of unity, coherence and emphasis.	x		
14.	Identify clincher sentences.	x		
*15.	Construct clincher sentences.	x		
*16.	Construct paragraphs using various methods of development.		x	
17.	Distinguish among narrative descriptive, expository and argumentative writing.		x	
18.	Construct a narrative paragraph of 6 sentences or more.	x		
19.	Construct a plan for a narrative composition.	x		
20.	Construct a narrative composition of 3 or more paragraphs.	x		
21.	Construct sentences using sensory words to describe observations, feelings, moods and feelings.	x		
22.	Construct a six sentence descriptive paragraph.	x		
23.	Construct a 3 - 5 paragraph descriptive paper.	x		
24.	Demonstrate the ability to limit topic.		x	
25.	Identify thesis statement.		x	

ENGLISH

COMPETENCY AREA: Writing-Formal Papers

TERMINAL OBJECTIVE: Organize research material into a formal paper according to purpose.

The student will:	10	11	12
1. Identify types of formal papers according to purpose. (ex. political speech, valedictorian address, salutatory address, oratorical)		X	
2. Develop a focus (thesis statement) for paper according to purpose.		X	
3. Develop a plan for writing the paper.		X	
4. Interpret and evaluate evidence from several sources.		X	
5. Construct an introduction for paper that identifies purpose.		X	
6. Develop the main idea in the body of paper.		X	
7. Evaluate the first draft of paper.		X	
8. Revise the paper.		X	
9. Construct a final paper.		X	
10. Organize research material into a formal paper according to purpose.		X	

ENGLISH

COMPETENCY AREA: Writing-Research Paper

TERMINAL OBJECTIVE: Apply research skills in planning and writing a reaearch paper.

The student will:	10	11	12
1. Define the research paper according to purpose and type.			x
2. Distinguish between appropriate and inappropriate topics for a research paper.			x
3. Apply the principle for limiting the selected topic to accommodate a research paper of desired length. (10-12 typewritten pages)			x
4. Construct a preliminary outline.			x
5. Construct the thesis statement.			x
6. Apply the rules for writing bibliography cards.			x
7. Apply the rules for writing note cards.			x
8. Apply the rules for writing footnotes.			x
9. Construct a final outline.			x
10. Construct the first draft of the research paper.			x
11. Revise the draft.			x
12. Construct a final research paper.			x
13. Arrange the parts of the paper in proper order.			x
14. Apply research skills in planning and writing a research paper.			x

SPEAKING SKILLS
INTRODUCTION

Oral communication is an effective tool for the development of the thought processes in as much as the formation of concepts often follows the discussion of ideas. Therefore, the objectives included in this listing have been developed to provide students with opportunities to engage in speaking activities through group interaction and formal and informal presentations. In addition to participating in structured speaking situations, the student will be encouraged to overcome individual problems with substandard speech habits, use slang, jargon and colloquial expressions appropriately, and adapt dialects advantageously for assuming life roles.

The aims of these objectives are to enable the student to develop ease in speaking, to improve the oral communication skills through realistic experiences, and to integrate oral communication with the total English program.

ENGLISH

COMPETENCY AREA: Speaking - Everyday Speaking

TERMINAL OBJECTIVE: Use level of speech appropriate to speaker's purpose.

The student will:	10	11	12
*1. Demonstrate ability to speak audibly and clearly.	x		
*2. Demonstrate habits of clear articulation, enunciation, and correct pronunciation.	x		
*3. Identify each level of speech.	x		
*4. Demonstrate the ability to shift from informal to formal speech and vice versa.		x	
*5. Determine the level of speech appropriate to the occasion.		x	
*6. Use level of speech appropriate to speaker's purpose.			x

ENGLISH

COMPETENCY AREA: Speaking - Presentation

TERMINAL OBJECTIVE: Plan and present a speech by using the techniques required for an effective presentation.

The student will:	10	11	12
*1. Identify the various types of speeches.	x		
*2. Describe the characteristics of an effective speech.	x		
*3. Demonstrate mastery of pronouncing unfamiliar words through dictionary skills.	x		
*4. Apply the principles of composition to the construction of speeches. (unity, coherence, emphasis)		x	
5. Use "attention getters".		x	
6. Demonstrate body movements, facial expression and eye contact necessary in oral presentation.		x	

ENGLISH

COMPETENCY AREA: Speaking - Formal Discussion

TERMINAL OBJECTIVE: Participate in formal discussion.

The student will:	10	11	12
*1. Identify types of formal discussion.		x	
2. Define panel discussion.		x	
3. Apply standard rules in preparing a panel discussion.		x	
4. Define terms used in debating.			x
5. Apply standard rules in preparing a debate.			x
6. Participate in formal discussion.			x

COMPETENCY AREA: Speaking - Group Dynamics

TERMINAL OBJECTIVE: Demonstrate the ability to carry out the responsibilities of an effective participant in group interaction.

The student will:	10	11	12
*1. Identify the purpose of the group discussion.	x		
2. Apply techniques for leading a discussion and evaluating.		x	
3. Identify roles of participants in group discussion.		x	
*4. Demonstrate the ability to carry out the responsibilities of an effective participant in group interaction.			x

LISTENING SKILLS
INTRODUCTION

Listening is the medium through which a large part of communication is achieved. It is an essential skill for helping students make sense out of what they hear, and it is a valuable way of providing data to which students can respond in a variety of modes.

For the purpose of using this listing of objectives efficiently, a clear distinction should be made between listening and hearing. Listening is an active attentive skill which contributes to the development of good thinking habits and significantly impacts upon the other communication skills of reading, writing, and speaking. Hearing is a more or less passive process.

Because of the vital importance of listening as a communication skill, this listing of objectives is recommended as a way of enabling students to listen effectively and critically.

ENGLISH

COMPETENCY AREA: Listening

TERMINAL OBJECTIVE: Demonstrate the ability to apply listening skills effectively in daily experiences.

The student will:	10	11	12
* 1. Follow oral instructions and directions.	x		
* 2. Determine contexual clues in comprehending new words.	x		
* 3. Identify the main idea and supporting ideas gathered through listening.	x		
* 4. Arrange ideas in sequence or chronological order after listening to oral presentation.	x		
* 5. Demonstrate ability to answer questions.	x		
* 6. Apply listening skills for effective notetaking.		x	
7. Evaluate the validity of the content of an oral presentation.		x	
8. Evaluate the speaker's style.		x	
9. Determine the difference between a well organized oral presentation and one that is poorly organized.		x	
10. Evaluate tone quality, pitch, inflection, articulation and stress in an oral presentation.			x
11. Distinguish between sound reasoning and poor reasoning in an oral presentation.			x
12. Demonstrate the ability to apply listening skills effectively in daily experiences.			x

*Suggested minimum essentials for high school graduation.

LANGUAGE DEVELOPMENT
INTRODUCTION

The study of language development helps the students to become aware of a number of important matters-- the history of the language he speaks, the variety of dialects, and the likelihood of confusion in communication because of the wide range of choices. The word stock of English reflects much historical information. The dialects are numerous because the language is spoken by so many different people in widely separated geographical and social groups. Often we fail to communicate successfully because the same language affects different people in different ways. This curriculum will encourage a continuing consciousness of these aspects of language and will enable students to develop power in using language.

ENGLISH

COMPETENCY AREA: Language Development

TERMINAL OBJECTIVE: Identify significant changes that have occurred in the development of the English language.

The student will:	10	11	12
* 1. Distinguish the differences between standard and nonstandard English.	x		
* 2. Identify regional differences in dialects.	x		
* 3. Determine the difference between slang and jargon.	x		
* 4. Tell why the media have such an impact on the English language.		x	
* 5. Tell why and how new words are added, dropped, and altered.		x	
6. Determine major differences between American and British English.			x
7. Explain the development and impact of the English dictionary.			x
8. Identify the three periods into which the history of language is divided. (Old English, Middle English, Modern English)			x
9. Explain influence of the invention of the printing press on English language.			x
10. Trace word history using the appropriate dictionary as a tool.			x
11. Identify changes in word meanings through the ages.			x
12. Identify significant changes that have occurred in the development of the English language.			x

*Suggested minimum essentials for high school graduation.

ENGLISH

COMPETENCY AREA: Language Development

TERMINAL OBJECTIVE: Use a vocabulary adequate to receive and convey ideas of varying degrees of complexity.

The student will:	10	11	12
*1. Apply the rules for standard English pronunciation indicated by diacritical marks.	x		
2. Demonstrate the use of these methods of vocabulary development:			
*A. Context clues	x		
B. Derivatives	x		
C. Word clusters based on a specific idea or subject	x		
*D. Antonyms, synonyms, homonyms	x		
*E. Latin, Greek, Anglo-Saxon prefixes and roots		x	
F. Analogies		x	
3. Expand vocabulary by consistent use of a variety of methods.		x	
4. Use a vocabulary adequate to receive and convey ideas of varying degrees of complexity.			x

*Suggested minimum essentials for high school graduation.

ENGLISH

COMPETENCY AREA: Language

TERMINAL OBJECTIVE: Analyze the social and psychological impact of words.

The student will:	10	11	12
*1. Use general and specific words appropriate to purpose.	x		
*2. Distinguish abstract words and concrete words.	x		
*3. Determine the difference between literal and figurative language.	x		
*4. Distinguish levels of word meaning (denotation and connotation).		x	
5. Identify euphemisms and explain their effect on social customs.		x	
6. Identify stereotype labels.		x	
*7. Identify persuasive techniques of word choice.			x
8. Analyze the social and psychological impact of words.			x

*Suggested minimum essentials for high school graduation.

Literature

Overview

Literature provides the content which enables students to acquire skills, insights, appreciations, and values. Accordingly, the objectives selected for the senior high school literature section reflect these priorities. Ultimately the students will experience literature as art and develop increased insight into the human condition.

Objectives in the literature section are developed in the broad areas of fiction and non-fiction. For the most part, no attention has been directed to specific content, but emphasis has been placed on the skills which will enable students to read literature critically and analytically.

Traditionally the study of literature at the senior high school level has focused on the introduction of literary types in the tenth grade, a survey of American literature in the eleventh grade, and a survey of British literature in the twelfth grade. Additionally, it is expected that in the course of the student's high school career, the study of literature will provide experience with the literary contributions of America's ethnic groups as well as experiences with that literature which has traditionally been considered a part of the American literary heritage.

It is also expected that students will gain experience with both British and World literature.

The teacher will have the responsibility for selecting those works which best meet the needs of the individual student. However, it is expected that these common understandings about the teaching of literature will be respected:

1. The teaching of literature is vital to the development of human values.
2. Literature expands the experiences of human beings.
3. Literature is of special value to individuals in search of their identity.
4. Through the study of literature one learns to understand human nature and the complexities of the human character.
5. Through the study of literature one gains an understanding of man's struggle with his environment.
6. Through the study of literature one gains knowledge of the ideas and conflicts that have engaged man over the centuries.
7. Through the study of literature one gains insight into the major modes of man - the comic mode, the romantic mode, the psychological introspective mode, and the ironic mode.

In all cases it is expected that the teaching of literature will not be an isolated process, but will be integrated with the development of the listening, speaking, and writing skills.

ENGLISH

COMPETENCY AREA: Fiction and Drama

TERMINAL OBJECTIVE: Analyze fiction (short story - novel) and drama by using the techniques of literary criticism.

The student will:	10	11	12
* 1. Identify the major elements.	x		
* 2. Distinguish among the different types.	x		
* 3. Analyze the character with reference to his/her actions, motivations, values, mannerisms, and appearances.	x		
4. Classify characters into types, major or minor, developing or static, round (three-dimensional) or flat (one-dimensional).		x	
5. Describe the author's method of revealing character.		x	
* 6. Describe the development of the plot.	x		
* 7. Analyze the relationship between the setting and the plot.	x		
* 8. Describe the nature of the conflict(s).	x		
9. Identify the details which establish the atmosphere.	x		
10. Analyze the advantages and disadvantages of using a given point of view.			x
11. Identify examples of literary devices.		x	
*12. Explain the significance of the title.	x		
*13. Describe the theme or themes.	x		
*14. Analyze the theme as a generalization about life.	x		

15.	Describe the style.			x
16.	Describe the attitude of the author.		x	
17.	Analyze a specific work as a reflection of the thinking, attitudes, morals, and standards of society.			x
*18.	Analyze the effects a given work has upon the reader.	x		
19.	Analyze fiction and drama by using the techniques of literary criticism.			x

ENGLISH

COMPETENCY AREA: Poetry

TERMINAL OBJECTIVE: Analyze poetry using the techniques of literary criticism.

The student will:	10	11	12
*1. Describe the characteristics of poetry that distinguish it from other forms of literature.	x		
2. Identify the major types of poetry.		x	
3. Identify the chief elements of poetry including:			
A. Figures of speech		x	
B. Poetic devices		x	
C. Rhyme schemes		x	
D. Rhythm patterns		x	
E. Stanzaic forms		x	
4. Describe the mood of a poem.		x	
*5. Demonstrate the ability to interpret the main idea or theme.		x	
6. Analyze poetry using the techniques of literary criticism.			x

ENGLISH

COMPETENCY AREA: The Essay

TERMINAL OBJECTIVE: Analyze the essay using techniques of literary criticism.

The student will:	10	11	12
*1. Identify the characteristics of the essay.		x	
2. Distinguish between the familiar essay and the formal essay.		x	
3. Identify the thesis statement.		x	
*4. Analyze the author's purpose in the essay.		x	
5. Describe the organization and method of development of the essay.		x	
*6. Discriminate fact from opinion in the essay.		x	
7. Evaluate the author's credentials in the subject.		x	
8. Analyze the essay using techniques of literary criticism.		x	

ENGLISH

COMPETENCY AREA: Biography and Autobiography

TERMINAL OBJECTIVE: The student will analyze biography and autobiography by using literary critism.

The student will:	10	11	12
*1. State the facts of the subject's life.		x	
2. Identify the progressive development of the subject's personality, including motives, deeds, values.		x	
3. Evaluate the accomplishments of the subject of a biography or autobiography.		x	
4. Identify the author's purpose.		x	
5. Identify the tone of the biography or autobiography.		x	
*6. Analyze biographies and autobiographies to gain insight into the ways men and women met challenges in their lives.		x	
7. Analyze biographies and autobiographies to gain insight into the social, intellectual, political and historical movements of given periods.		x	
8. Analyze biography and autobiography by using literary criticism.		x	

399

Study Skills - An Overview

The development of effective study skills is fundamental to the success of all students. Maintaining a program of practical study skills enables students to assume some of the the responsibility for what they learn by actively participating in the learning process.

The objectives in the study skills section are developed in the areas of general strategies, reference skills strategies, and test-taking strategies. Although the emphasis in the study skills section is English, many of the objectives listed are applicable to other disciplines.

The ultimate goal of the objectives in this section is to improve the overall academic performance of students, prepare them for college or a career, and enable them to function effectively in society.

ENGLISH

COMPETENCY AREA: Study Skill Strategies

TERMINAL OBJECTIVE: Identify and use study skill strategies.

The student will:	10	11	12
* 1. Identify the main idea from text.	x		
* 2. Identify specific details from text.	x		
* 3. Draw inferences or conclusions from what is read.	x		
* 4. Employ techniques of vocabulary building.	x		
* 5. Apply rules for summarizing.	x		
* 6. Demonstrate skill in reading graphs.	x		
* 7. Use techniques for locating information.	x		
* 8. Order ideas in logical sequence.	x		
* 9. Describe the parts of the book.	x		
10. Apply techniques for writing a precis.		x	
*11. Demonstrate skill in paraphrasing.		x	
*12. Employ skills in the use of various kinds of dictionaries.		x	
*13. Identify and use study skill strategies.		x	

*Suggested minimum essentials for high school graduation.

ENGLISH

COMPETENCY AREA: Study Skills / References

TERMINAL OBJECTIVE: Locate, organize and use information from a variety of references appropriate to the purpose.

The student will:	10	11	12
* 1. Use the card catalog to locate material appropriate to the purpose.	x		
* 2. Identify the Dewey Decimal and the Library of Congress systems of classification of books.	x		
* 3. Use references (*Reader's Guide*, *Book Review Digest*, etc.) to locate material appropriate to purpose.		x	
* 4. Demonstrate skill in using community resources.		x	
5. Apply interview techniques to obtain material appropriate to purpose.		x	
6. Use methods of notetaking.		x	
* 7. Demonstrate the ability to organize material.		x	
8. Construct a bibliography.		x	
9. Assess the value of different sources.		x	
10. Locate, organize, and use information from a variety of references appropriate to the purpose.		x	

*Suggested minimum essentials for high school graduation.

ENGLISH

COMPETENCY AREA: Study Skills/Test Taking

TERMINAL OBJECTIVE: Apply test-taking strategies appropriate for career and college entrance tests.

The student will:	10	11	12
* 1. Apply the techniques of listening for oral directions.		x	
* 2. Interpret the directions.		x	
* 3. Identify the varied techniques for marking responses on a test.		x	
* 4. Demonstrate the ability to record the correct response.		x	
* 5. Employ the principles of time economy in test taking.		x	
* 6. Examine carefully all possible responses before attempting to choose the correct answer.		x	
* 7. Follow the directions concerning allotted time and penalty contingencies.		x	
* 8. Construct and use aids in remembering key items in preparing for a test.		x	
* 9. Identify key words in test items.		x	
*10. Organize answers to essay questions.		x	
*11. Apply test-taking strategies appropriate for career and college entrance tests.		x	

*Suggested minimum essentials for high school graduation.

Media Analysis

In view of the impact of television, radio, and movies on today's society and the responsibility of the school to prepare individuals for living in the modern world, no English curriculum is complete without a section that relates to the mass media. It is imperative that students understand the scope and methods of the mass media and become aware of the power and influence of the media in shaping their attitudes, lifestyles, and buying habits. The result will be the realization by the students that they can enjoy programs and advertising with discrimination and awareness without being controlled or manipulated. Accordingly, the English teacher will aim to provide the student with information about, intelligent defenses against, and standards for judging all forms of mass media.

ENGLISH

COMPETENCY AREA: Media Analysis

TERMINAL OBJECTIVE: Analyze the impact of mass media on society.

	The student will:	10	11	12
*1.	Explain the term mass media.	x		
*2.	Describe the types of mass media.	x		
*3.	Explain certain basic terms and techniques relating to each medium.	x		
*4.	Evaluate the mass media and decide whether they have a beneficial or harmful influence.	x		
*5.	Compare and contrast the different types of mass media.	x		
*6.	Distinguish fact from opinion in mass media.	x		
*7.	Identify common propaganda techniques.	x		
8.	Evaluate the impact of propaganda techniques on audience.		x	
*9.	Identify techniques used by mass media in advertising.		x	
10.	Evaluate the impact of advertising on the individual.		x	
11.	Construct criteria for critically examining media offerings.		x	
12.	Recommend ways in which one should cope with the mass media.		x	
13.	Analyze the impact of mass media on society.			x

*Suggested minimum essentials for high school graduation.

PRELIMINARY DRAFT PRELIMINARY DRAFT

COMPETENCY BASED CURRICULUM

MATHEMATICS SCOPE AND SEQUENCE

SENIOR HIGH SCHOOL COURSES

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

DR. VINCENT E. REED
SUPERINTENDENT
1978

Table of Contents

Page

Applied Mathematics

Course description 1
Topics 2
Objectives 3

Topics I

Course description 6
Topics 7
Objectives 8
Hierarchies 12

Algebra I

Course description 15
Topics 16
Objectives 17
Hierarchies 23

Geometry

Course description 30
Topics 31
Objectives 32

Algebra II

Topics 36
Objectives 37
Hierarchies 42

Trigonometry

Course description 51
Objectives 52

College Algebra

Course description 54
Objectives 55

Unified College Algebra and Trigonometry

Course description 58
Objectives 59

Page

Elementary Functions and Analytical Geometry

Objectives 64

Calculus

Course description 66
Objectives 67

Introduction to Computer Programming

Course description 70
Topics 71
Objectives 72
Hierarchies 78

Computer Mathematics

Course description 89
Objectives 90

Computer Mathematics - Option II

Objectives 91

Advanced Topics in Mathematics

Objectives 92

PREFACE

The Senior High School Scope and Sequence defines course objectives that are to serve as a focal point of competency-based instruction. These objectives contribute to the development of specified competencies.

Competencies that constitute mathematical literacy essential for effective life-role functioning and toward which the general mathematics program of the D. C. Public Schools is directed are:

READING, WRITING, AND USING NUMBERS CORRECTLY IN RECEIVING OR CONVEYING QUANTITATIVE INFORMATION.

PERFORMING COMPUTATIONS APPLICABLE IN CONSUMER SITUATIONS.

ANALYZING PROBLEMS AND APPLYING RULES OF LOGIC IN REACHING VALID CONCLUSIONS.

ESTIMATING MEASUREMENTS AND RESULTS OF COMPUTATIONS.

CHECKING RESULTS FOR REASONABLENESS.

MEASURING DISTANCE, WEIGHT, TIME, CAPACITY AND TEMPERATURE WITH APPROPRIATE INSTRUMENTS OR DEVICES.

IDENTIFYING GEOMETRIC FORMS FOUND IN THE ENVIRONMENT AND APPLYING RULES FOR FINDING THEIR PERIMETERS, AREAS, AND VOLUMES AS NECESSARY IN MEASUREMENT AND PROBLEM SOLVING.

INTERPRETING AND CONSTRUCTING SIMPLE TABLES, CHARTS, GRAPHS, AND SCALE DRAWINGS.

APPLYING SENIOR HIGH SCHOOL CONCEPTS OR PROBABILITY IN DETERMINING THE LIKELIHOOD OF FUTURE EVENTS.

IDENTIFYING USES OF THE COMPUTER IN EDUCATION, FINANCIAL TRANSACTIONS, AND IN INFORMATION STORAGE AND RETRIEVAL.

The objectives identified for the various courses in the senior high school program contribute to the development of competencies essential to life-role functioning and to preparation for college experiences or specialization. It is recognized that all high school mathematics course offerings are essentially elective for students. If, however, a student enrolls for courses, it should be expected that he/she master objectives defined for the course.

The mathematics curriculum is continually being refined to serve the needs and interests of our students. Each teacher is asked to contribute recommendations for modification or revision.

410

ACKNOWLEDGEMENTS

The Competency-Based Curriculum Scope and Sequence for Senior High School Mathematics has been prepared by the following persons:

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June M. Manning	Eastern Senior High School

Dorothy C. Stephens, Curriculum Director

* Participated with committee in writing period February, 1977.

APPLIED MATHEMATICS

The Applied Mathematics course here is designed for general mathematics students who have been found deficient in basic computational skills.

The course is intended to be activity oriented. The areas to be covered are operations with whole numbers, fractions, decimals, and ratio rational/proportion. These areas are covered with applications to situations encountered by students. Additionally, some attention is given to properties of operations and to number theory.

APPLIED MATHEMATICS

A. Whole Numbers

B. Fractions

C. Decimals

D. Ratio and Proportion

Mathematics 414

APPLIED MATHEMATICS

A. Whole Numbers

The Applied Mathematics student will be able to:

1. Identify the place value of any digit in a given whole number.
2. Identify the face value of any position in a given whole number.
3. Read and write numerals representing whole numbers.
4. Write the expanded form when given a whole number and vice versa.
5. Round off a given whole number to tens, hundreds, thousands, etc.
6. Given a set of items (40 - 100) estimate the group size within ± 5.
7. Given a set of whole numbers, find the sum.
8. Find the difference of two numbers.
9. Find the product of two whole numbers.
10. Find the quotient of two numbers.
11. Given a group of examples which illustrate a) commutative, associative and distributive properties, b) identity, c) zero as a factor, distinguish which property is illustrated.
12. Given problems involving whole numbers, estimate the answer within the degree of accuracy appropriate to the actual result.
13. Demonstrate the use of the properties when given examples in addition and/or multiplication.
14. Compute area, perimeter, and volume of rectangular regions and solids.
15. Solve and verify verbal problems involving who numbers.

B. Fractions

The Applied Mathematics student will be able to:

1. Identify factors of a number.

2. Distinguish prime numbers from composites.

3. Factor a given number into primes.

4. Find common factors of two numbers.

5. Write a given fraction in lowest terms.

6. Identify fractions equivalent to a given fraction.

7. Given a set of fractions of the form $\frac{a}{b}$ where a b, find the product of fractions in the set.

8. Write fractions equivalent to a given fraction.

9. Express whole numbers as fractions with specified denominators.

10. Write mixed numbers as fractions and conversely.

11. Write the reciprocal of given non-zero numbers.

12. Multiply two or more fractions and express results as fractions, mixed numbers or whole numbers.

13. Add two or more fractions.

14. Find the difference of two fractions.

15. Find the quotient of two fractions.

16. Solve problems which involve more than one operation.

17. Given diagrams divided into equal regions, identify fractional parts represented by shading.

18. Represent a given set of fractions as points on a number line.

19. Measure and/or draw figures with specified dimensions that include fractions.

20. Answer interpretive questions based on graphs (bar, line, circle, divided bar)).

21. Given appropriate situations involving group sizes, give estimates of fractional parts.

22. Solve word problems which involve fractions.

C. Decimals

The Applied Mathematics student will be able to:

1. See A3.
2. Identify face and place value in decimal numerals.
3. Read and write any decimal numeral.
4. Plot (approximate) decimal numbers on a number line.
5. Measure and/or draw using metric measures.
6. Answer interpretive questions from graphs which use decimal units.
7. Find the sum of decimals (including whole numbers).
8. Subtract decimals.
9. Find the product of 2 decimal fractions.
10. Compute the quotient where the divisor and/or dividend is a decimal.
11. Write a given fraction as a terminating or repeating decimal.
12. Solve verbal problems involving decimals.

D. Ratio/Proportion

1. See B 8.
2. Select expression which illustrates the ratio of two numbers from a list of expressions.
3. State an appropriate ratio for a given relationship.
4. Use ratio and proportions to solve problems related to scaled drawings, distance-time-rate, percent, graphs, unit pricing, similar figures.

TOPICS I

Course Description

Topics I is designed for the general math student who is already proficient in the basic computational skills. Much of the course is highly consumer oriented. It treats selected topics encountered in the applications of mathematics, in addition to topics from number theory, algebra and geometry.

417

TOPICS I

A. Comparative Shopping

B. Employee Problems

C. Proportion-Related Problems

D. Number Theory

E. Probability

F. Algebra and Geometry

TOPICS I

A. Comparative Shopping

The Topics I student will be able to:

1. Compute sales tax, excise tax, interest using percents, when given necessary data.
2. Compute total cost of a list of items when given unit costs and sales tax rate.
3. Compute the amount of down payment needed to keep monthly payments below a specified amount, given the costs and terms of the purchase.
4. Use tables to locate specific information.
5. Compute total cost of articles when given down payments, interest, length of payment, etc.
6. Determine relative costs of different modes of travel (car, bus, train, airplane) when given necessary data.
7. Determine the costs of different types of insurances for a given situation.
8. Determine the total amount of a loan when given conditions of the loan.
9. Determine the amount in a savings account at a given time when given amount, rate of interest, and frequency with which interest is computed.
10. Compute the balance in a checking account at a specified time, when given conditions of a transaction.
11. Solve problems which relate to banking services.
12. Use various computational skills to make the most economic selections in consumer services.

B. Employee Problems

The Topics I student will be able to:

1. Compute total wages when given unit wages, overtime rates, commission rates and length of work period.

2. Fill out form 1040-a based on student related information.
3. Given personal tax related data, select the conditions which dictate using 1040.
4. Fill out form 1040 requiring itemizing deductions.
5. Fill out form 1040 requiring computing the tax.

C. Proportion-Related Problems

The Topics I student will be able to:

1. Solve a proportion.
2. Compute lengths or distances from given scale drawings.
3. Make a scale drawing of a room when given its dimensions.
4. Adjust given recipes upward or downward.
5. Determine one's total caloric intake for a day.
6. Determine approximate food costs per person in a family.
7. Determine food costs per serving when given total costs and number of servings.

D. Number Theory

The Topics I student will be able to:

1. Distinguish even and odd numbers.
2. Define tests for divisibility by 2, 3, 4, 5, 9, 10.
3. Write whole numbers that are divisible by any combinations of 2, 3, 4, 5, 9, 10.
4. Classify numbers less than 500 as prime or composite, using divisibility tests.
5. Factor composite numbers into primes.
6. Illustrate Goldbach's conjecture with at least ten even numbers greater than 50.
7. Identify square and triangular numbers.
8. List the numbers in the Fibonacci sequence, given the first three numbers.

9. Given a geometric or algebraic sequence, write the next n terms.

10. Supply missing terms in a given sequence.

E. Probability

The Topics I student will be able to:

1. Find the probability of a single event.
2. Find the probability of one event or another.
3. Find the permutation of a group of objects.
4. Find the probability of successive events.
5. Solve problems involving probabilities, permutations.
6. Prepare frequency table for a given set of data.
7. Find the mean, median, mode of a set of data.
8. Determine the appropriate graph to represent a given set of data.
9. Construct a bar graph and line graph that represents a given set of data.
10. Construct circle and divided bar graphs to depict appropriate sets of data.
11. Answer interpretive questions related to graphs.
12. Answer comparative questions from composite graphs.

F. Algebra and Geometry

The Topics I student will be able to:

1. Name absolute value of any given rational number.
2. Add rational numbers.
3. Multiply rational numbers.
4. Evaluate simple expressions.
5. Use the distributive law to write products of expressions a(x+b) where any or all are numbers.
6. Write the reciprocal of a non-zero rational number.

7. Solve equations of the form $ax=b$ where a and b are rationals and $a \neq 0$.

8. Solve equations of the form $ax+b = c$.

9. Solve simple verbal problems which employ equations of the form $ax=b$ or $ax+b=c$.

10. Express a comparison of two quantities in ratio form.

11. Solve a proportion.

12. Distinguish figures that are similar.

13. Find the dimensions of similar figures based on dimensions given or a stated ratio of similitude.

14. Solve problems which involve similar figures.

15. Classify angles according to size.

16. Identify adjacent, complementary, supplementary, vertical angles (pairs of angles).

17. Find the measure of specific angles, using a protractor, to a 2 degree accuracy.

18. Name polygons according to number of angles.

19. See F4.

20. Find areas and perimeters of rectangles and triangles.

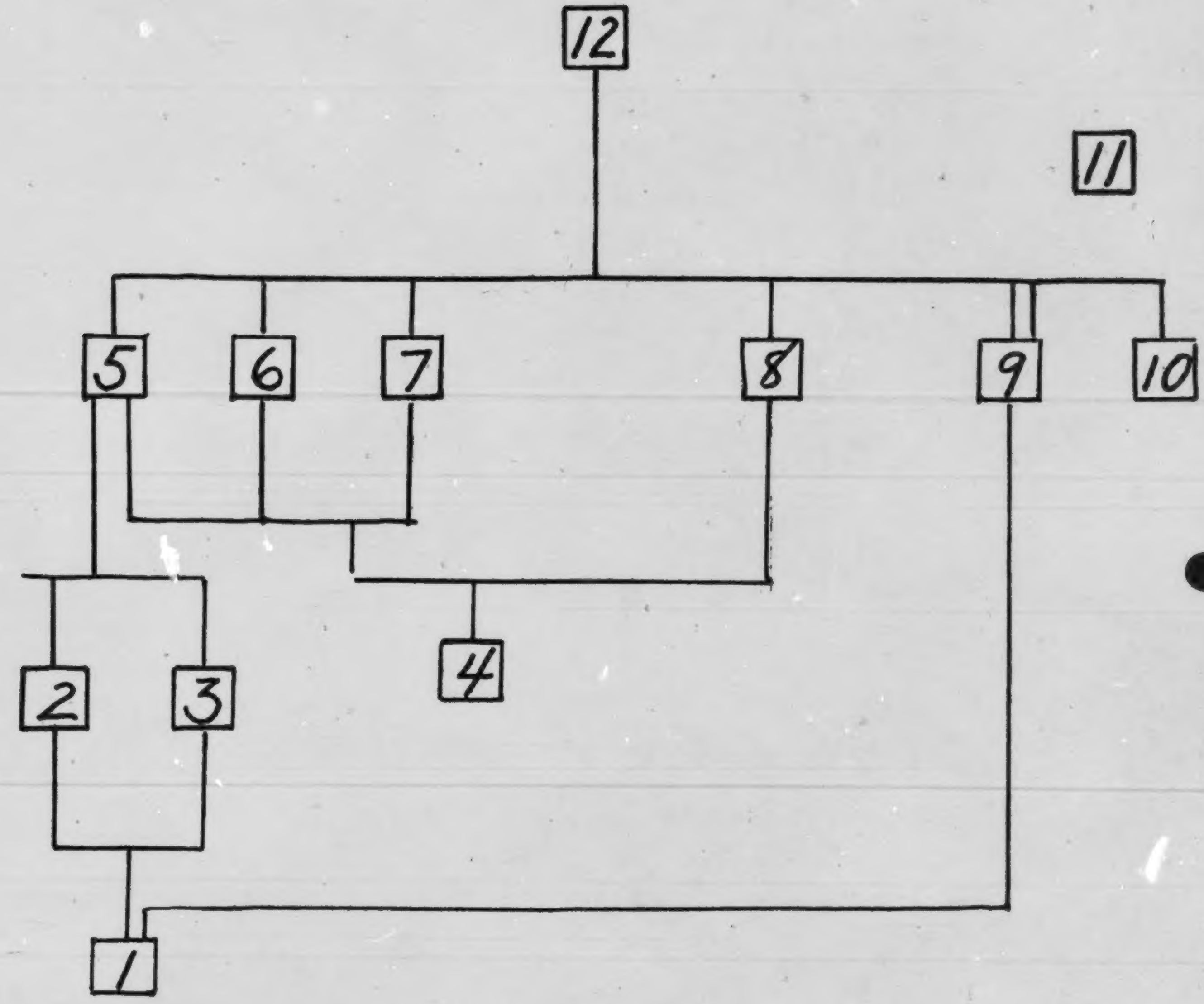
21. Given a rectangular prism, find the

    a) sum of the measure of the edges
    b) total surface area
    c) volume of the figure.

22. Solve consumer problems that involve area and perimeter.

TOPICS ONE

Comparative Shopping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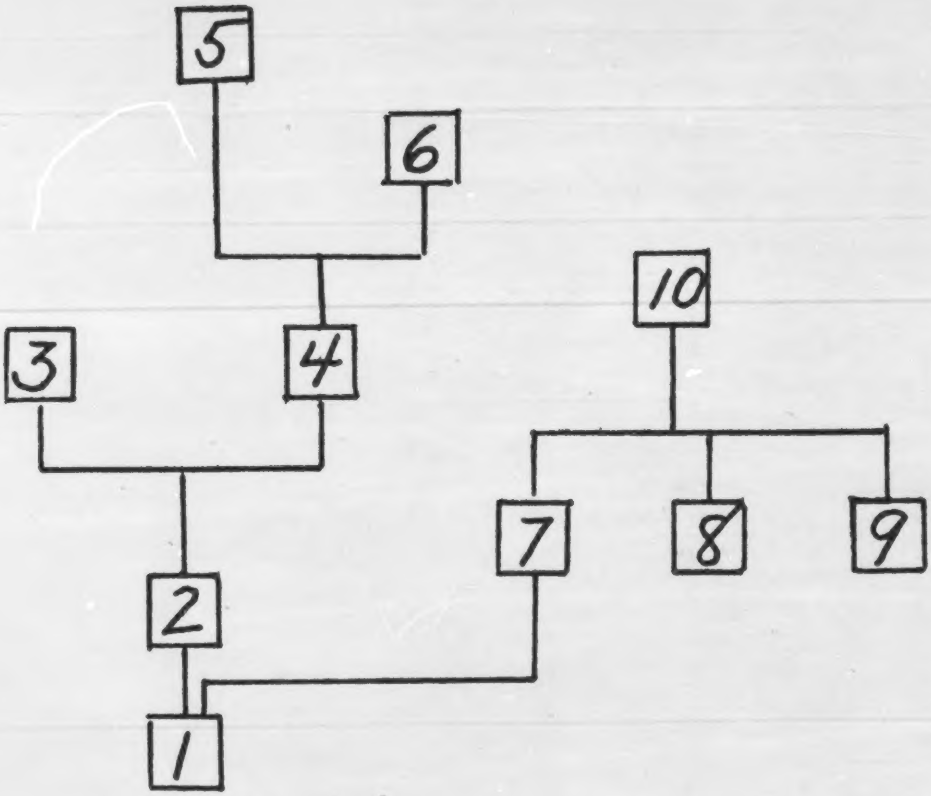
423

TOPICS ONE

Number Theory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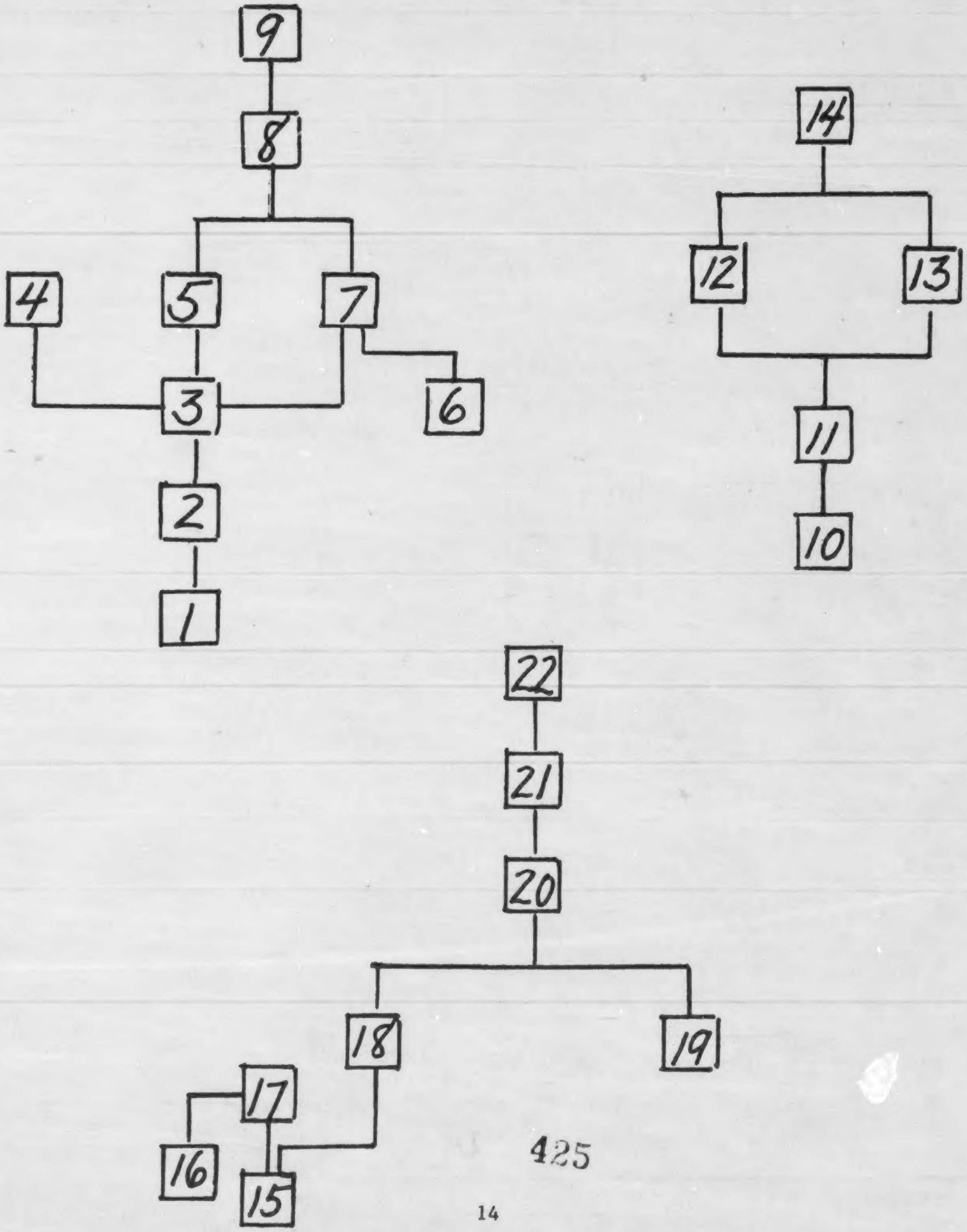
TOPICS ONE

Algebra and Geometry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425

ALGEBRA ONE

Course Description

Algebra I is a basic full-year course in academic (college preparatory) mathematics. It deals with development of computational skills and techniques necessary to understand algebraic systems or processes through the properties of the system of real numbers. It is offered to students who have attained average or above average achievement in mathematics, and who desire an academic mathematics program.

ALGEBRA ONE

A. Introduction to Algebra

B. Rational Numbers and Equations

C. Polynomials

D. Products and Factors

E. Systems of linear equations

F. Fractions

G. Radicals

H. Quadratics

ALGEBRA ONE

Objectives

A. Introduction to Algebra

The student will be able to:

1. Given the description of a set by rule, specify the set by roster and vice versa.
2. Given appropriate set specifications, classify sets as infinite or finite, subsets, empty, equal, equivalent.
3. Identify sets of numbers by roster, rule graph.
4. Illustrate the relationship of the set of integers, rationals, and irrationals to the set of real numbers by diagram or symbols.
5. Simplify an expression containing symbols of grouping.
6. Apply the rules for order of operation (including grouping) to simplify an expression.
7. Given an Algebraic expression, name coefficient, factors, exponent and terms.
8. Translate a given algebraic expression into words.
9. Name properties of operations on real numbers by:
    a. Matching examples with listed property;
    b. Naming property being illustrated;
    c. Giving an example of specific property.
10. Name the property of equality (reflexive symmetric, transitive) applied in each example in a list of examples.
11. Solve problems involving any combination of terms or ideas expressed in preceding objectives.

428

B. Rational Numbers and Equations

The student will be able to:

1. Name the absolute value of any rational number.
2. Add rational numbers
3. Subtract rational numbers
4. Multiply rational numbers
5. Divide rational numbers
6. Simplify number phrases (rational numbers) by applying the rule of order of operations.
7. State the order relationship of two given numbers by using an order symbol.
8. Translate verbal phrases and sentences into algebraic symbols or open sentences.
9. Use the Multiplication axiom to solve appropriate equations.
10. Solve equations by using division axiom.
11. Solve equations which require the use of the addition axiom.
12. Solve equations by using the subtraction axiom.
13. Solve equations which require using more than one axiom.
14. Solve open sentences that require the application of the distributive property.
15. Solve equations that contain variables in both members.
16. Find the solution set of open sentences requiring the grouping of variables in both members.
17. Evaluate a literal expression.
18. Solve literal equations for a specified variable.

C. Polynomials

The student will be able to:

1. Given an Algebraic expression; Name coefficient, factors, exponent and terms. (See A - 7)
2. Given two or more monomials, combine the terms that are similar.
3. Given two or more Monomials, apply the rules of exponents in simplifying products.
4. Apply the rules of exponents to simplify the indicated quotient of two monomials.
5. Given two or more polynomials, write their sum in simplest form.
6. Apply the distributive property and rules of exponents to multiply a polynomial by a monomial or a polynomial.
7. Simplify the quotient of two polynomials.
8. Simplify polynomial expressions involving more than one operation.
9. Solve word problems involving polynomial expressions.

D. Products and Factors

The student will be able to:

1a. Name and identify the prime factors of integers.

1b. List the distinct factors of a Monomial.

2. Apply the rules of exponents to simplify the indicated quotent of two Monomials.
3. Write the product of the sum and difference of the same two numbers.
4. Given a binomial, write its trinomial square.
5. Write the binomial factors of the difference of two squares.
6. Factor a perfect square trinomial.
7. Write the factors of a general trinomial.
8. Factor a polynomial product by combining the use of various factoring techniques.
9. Solve quadratic equations by factoring.

10. Simplify polynomial expressions involving more than one operation.

11. Solve equations which are presented in factored form.

12. Solve appropriate word problems, which lead to quadratic equations, by factoring.

E. Systems of linear equations

The student will be able to:

1. Locate the point represented by an ordered pair on a grid.

2. Given a location on grid, name the distinct coordinates of that point.

3. Given a set of ordered pairs, name the domain and the range.

4. Draw the graph of a relation when given a set of ordered pairs.

5. Given a list of relations, select those that are functions.

6. Determine the slope of a line when given:

   a. the equation, b. the graph, c. 2 pts. on the line.

7. Given an equation in general form, write the equation in its slop-intercept form.

8. Given the equation of a line, determine its x-intercept and its y-intercept.

9. Write the equation of a line when given 2 points, a point and its slope, its slope and intercept.

10. Given the slope and the y-intercept of a line, draw the graph of the line.

11. Find the solution to a system of equations by graphing and locating the point of intersection if it exists.

12. Given a system of equations,

    a. Determine if consistent, inconsistent, or dependent and/or

    b. Determine if the graphs are parallel, collinear or intersecting and/or

    c. Determine if there are no solutions, one solution, or many solutions.

13. Solve systems of equations by substitution, Algebraically (addition/subtraction), or by linear combinations.

14. Solve verbal problems which employ systems of equations in two unknowns.

F. Fractions

The student will be able to:

1. See A6
2. See D8
3. Express Algebraic fractions in simplest terms.
4. State a ratio appropriate to a given relationship.
5. Given a set of conditions, write the appropriate proportion.
6. Name the reciprocal of a given fractional expression.
7. Multiply fractional expressions and express results in simplest terms.
8. Divide fractional expressions.
9. Find the L.C.M. of Algebraic expressions.
10. Compute sums and differences of expressions with like denominators when given these expressions.
11. Find the sums and differences of expressions with unlike denominators when these expressions have been given.
12. Simplify expressions involving Multiplication and division of fractional expressions.
13. Simply a given set of expressions requiring the use of a combination of operations.
14. See B13
15. Solve equations and inequalities involving fractions.
16. Solve verbal problems requiring use of fractional equations when given the appropriate verbal problem.

G. Radicals

The student will be able to:

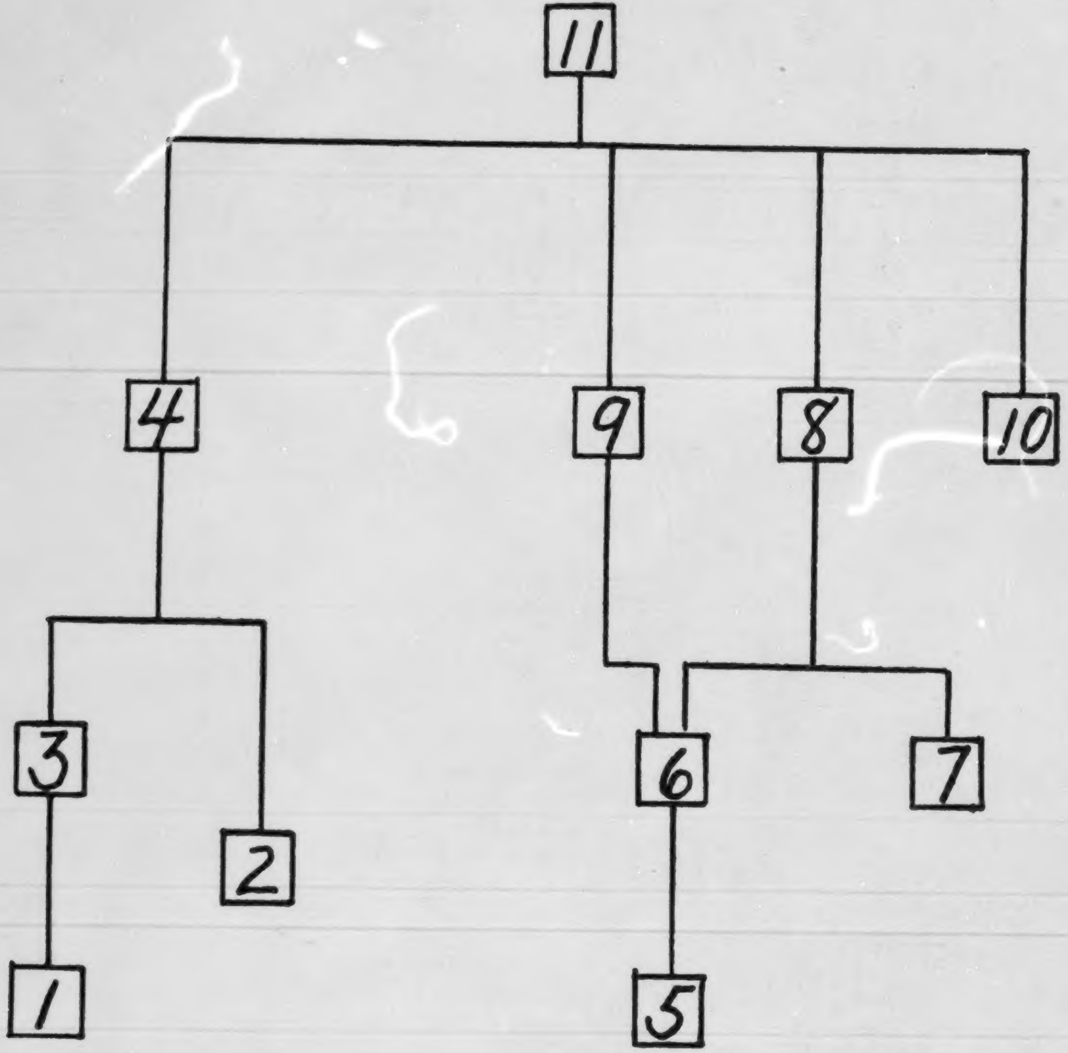
1. See A4
2. Name roots of perfect squares.
3. Determine square roots of numbers by using approximations, table, or calculator.
4. Simplify radical expressions containing perfect square factors.
5. Multiply numbers that contain radicals.
6. Simplify expressions containing radicals that require rationalizing denominators.
7. Divide numbers that contain radicals.
8. Add numbers that contain radicals.
9. Subtract numbers that contain radicals.
10. Write a radical expression in simplest form.
11. Solve equations containing radical expressions with the variable in the radicand.

H. Quadratics

The student will be able to:

1. Name the values of a, b, and c in a given quadratic equation.
2. Solve equations by quadratic formula.
3. Determine the factorability of a given quadratic expression by using the discriminant.
4. Solve quadratic equations by factoring. (D 12)
5. Solve quadratic equations by graphing.
6. Solve word problems which require the use of quadratic equations.

A - Introduction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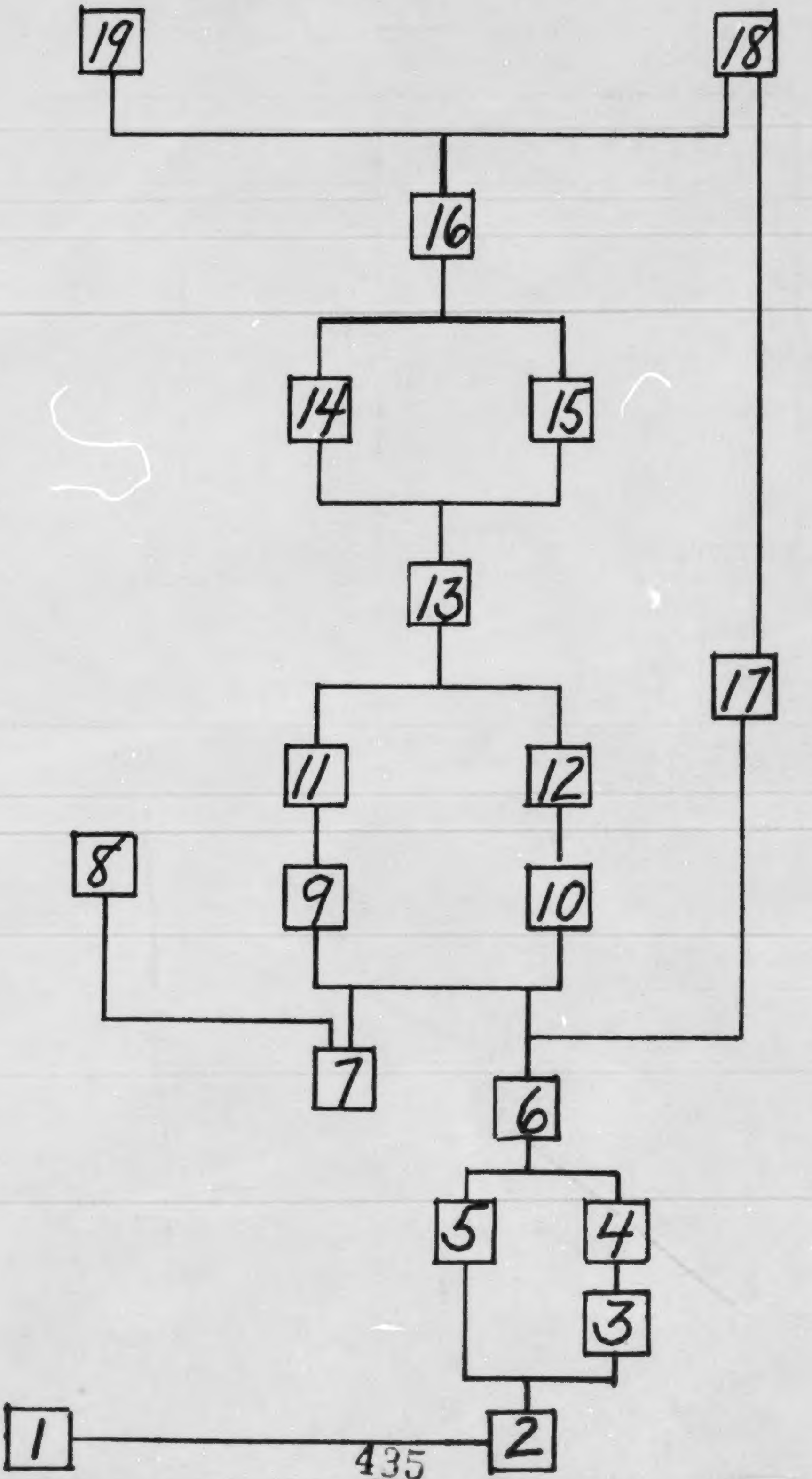
ALGEBRA 1

B - Rational Numbers & Equations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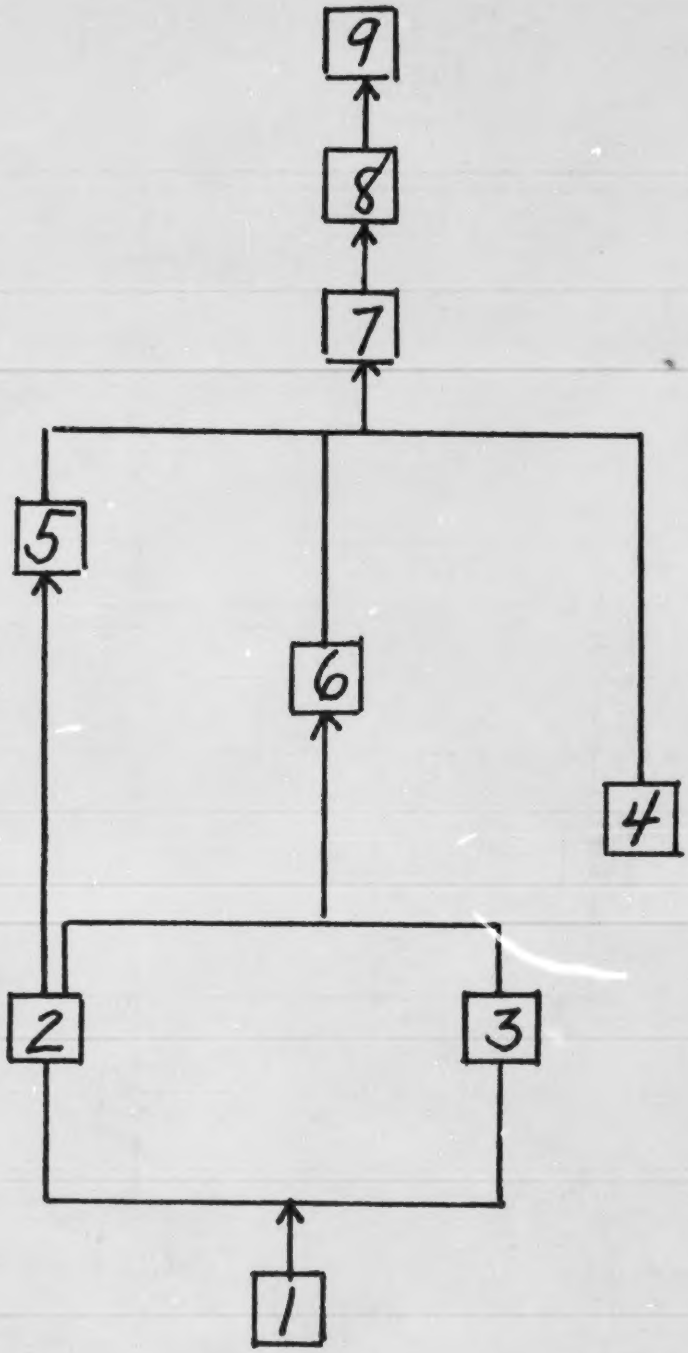
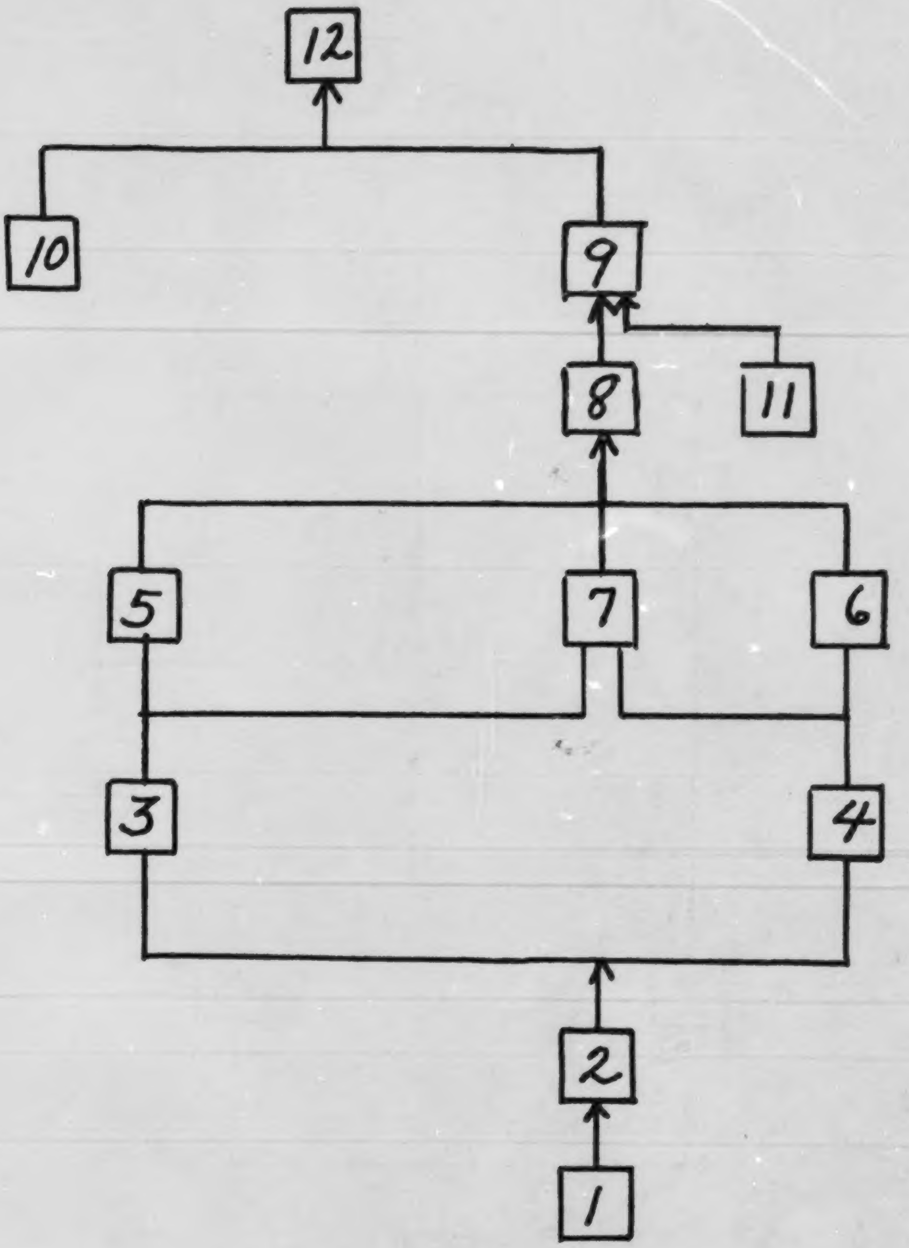
ALGEBRA 1

Polynomials



ALGEBRA 1

D - Factors / Products / Equations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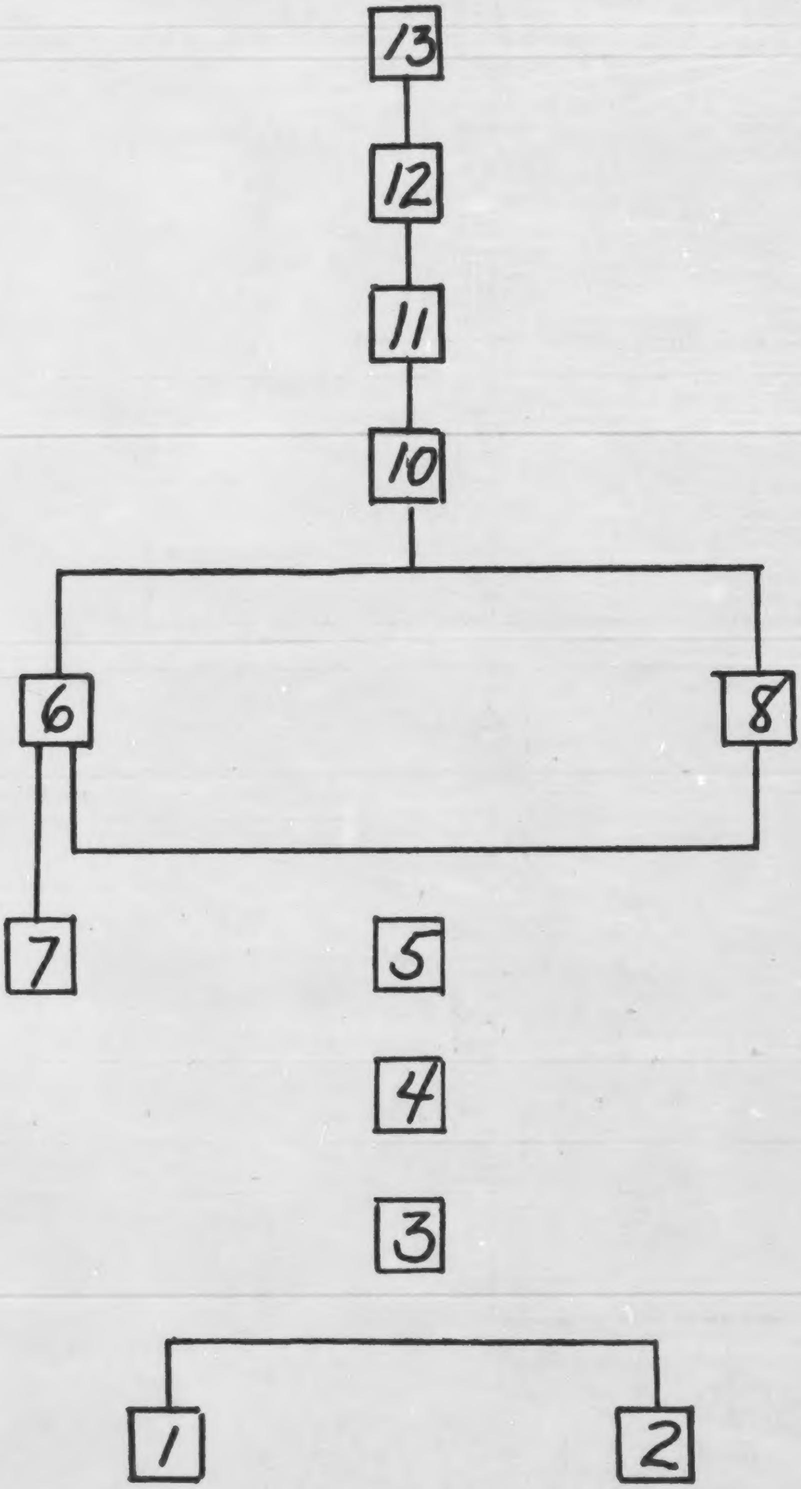
ALGEBRA 1

Systems of Linear Equations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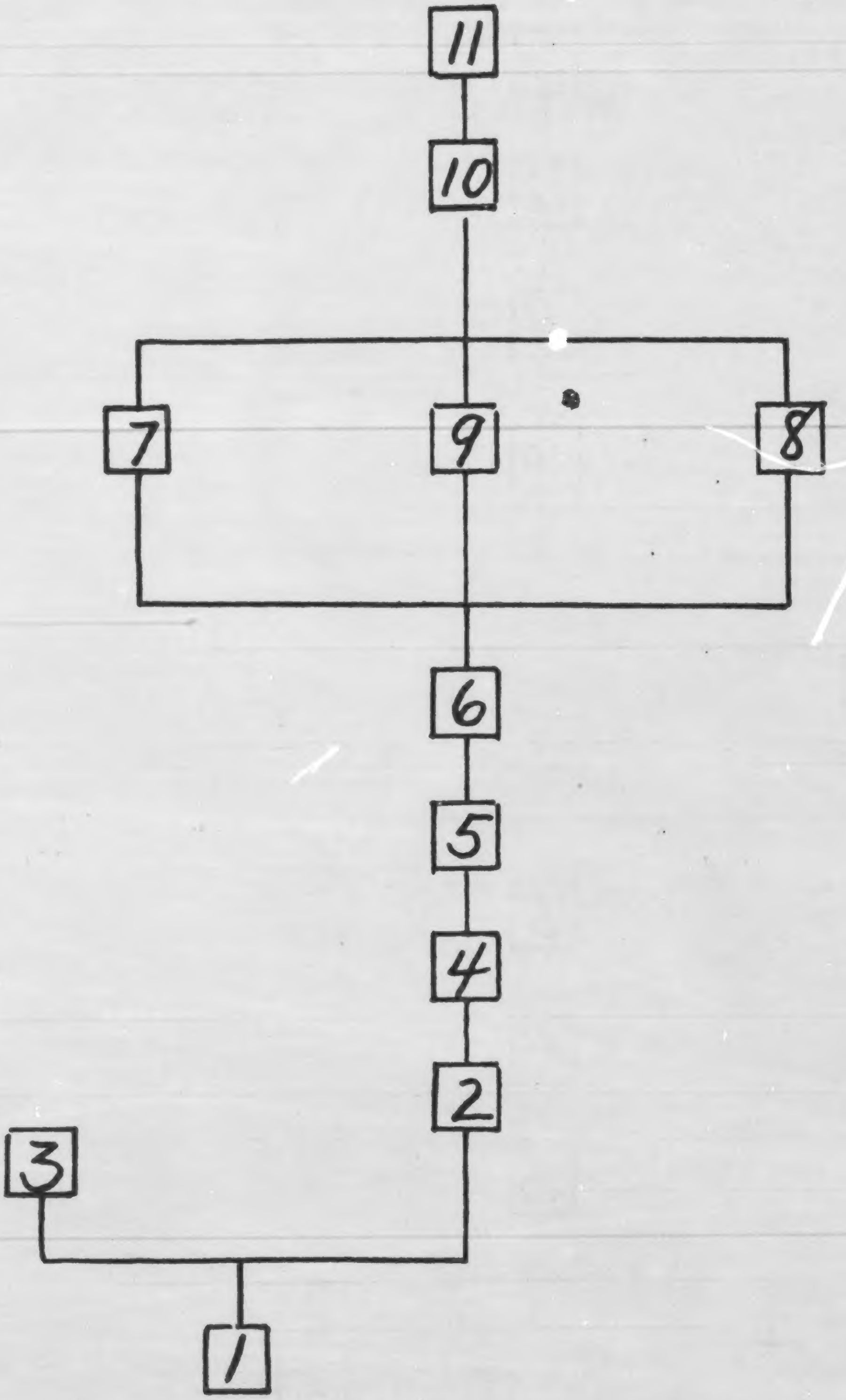
ALGEBRA 1

Radicals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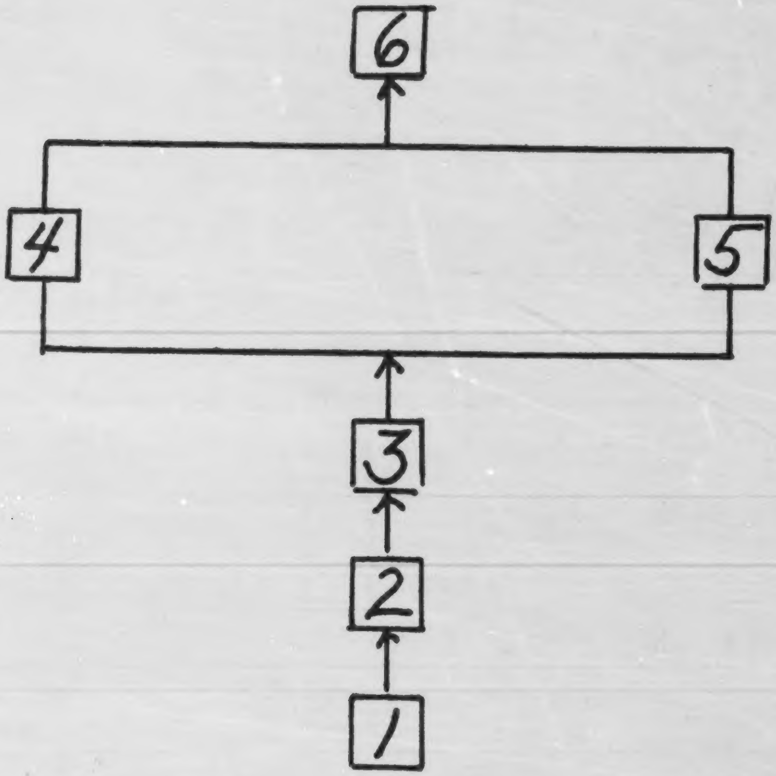
ALGEBRA 1

Quadratics



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GEOMETRY

Course Description

Geometry is offered to the student who has satisfactorily completed Algebra 1.

It focuses on the use of precise language, use of deduction as a means of proof, and the improvement of the learner's quality to think and reason in both mathematical and non-mathematical situations.

Emphasis is given to basic concepts, use of definitions and postulates, study and construction of geometric figures, proofs of theorems and applications of these theorems. The close relationship of algebra and geometry is emphasized by the use of coordinate geometry and logic throughout the year to give added meaning to constructions and proofs.

441

GEOMETRY

A. Basic language and tools of measurement

B. Methods of Reasoning

C. Lines and Angles

D. Congruent Triangles

E. Quadrilaterals and other Polygons

F. Similarities

G. Pythagorean Theorem

H. Circles

I. Areas and Volumes

GEOMETRY

Objectives

A. Basic language and tools of measurement

The student will be able to:

1. Identify and use appropriate symbols for and illustrations of points, lines, rays, line segments, angles.
2. Given one or more lines, describe line position and/or line relationships.
3. Represent geometric concepts figures, and relationships by using appropriate symbols and abbreviations.
4. Use appropriate tools in measuring or constructing specified geometric figures.

B. Methods of Reasoning

The student will be able to:

1. Draw conclusions, to be tested for validity, by using inductive reasoning.
2. Determine the hypothesis and conclusion of a given "if-then" statement.
3. Given a conditional statement, write it in the "if-then" form.
4. Given an algebraic statement, identify the axiom of equality or inequality it represents.
5. Use axioms of equality or inequality as conclusions for geometric statements.
6. Write simple 2 - column deductive proofs, using definitions and axioms.
7. Distinguish between inductive and deductive reasoning.

C. Lines and Angles

The student will be able to:

1. Given sufficient conditions, fine the slope of a line.
2. Identify angles formed when 2 lines intersect.
3. Identify angles formed when 2 lines are cut by a transversal.
4. Construct congruent, angles, using appropriate geometric tools.
5. Apply the definition of complementary and supplementary angles to solve problems involving angle measurement.
6. Construct perpendicular lines
7. Given sufficient conditions, prove that 2 lines cut by a transversal are parallel.
8. Construct parallel lines.
9. State and apply basic definitions, postulates, and theorems concerning angles, line segments and their measures.

D. Congruent Triangles

The student will be able to:

1. Determine corresponding parts, given either a figure or a statement of congruence.
2. Use the SAS, ASA, SSS postulates or theorems to determine congruent triangles, given appropriate conditions.
3. Given the definition of a right triangle and methods for proving triangles congruent, prove and apply theorems for right triangles.
4. Given the definition of an isosceles triangle and methods for proving triangles congruent, prove and apply theorems for isosceles triangles.
5. Prove specified line segments or angles congruent by using congruent triangles and the definition of corresponding parts.

E. Quadrilaterals and other Polygons

The student will be able to:

1. Identify and classify polygons according to their number of sides or kinds of angles.

2. Identify and state properties of quadrilaterals.

3. Determine sum of interior angles of a triangle.

4. Use the formula for the sum of the measures of the interior $\angle s$ of a convex polygon and the fact that the measures of the exterior $\angle s$ is 360°, to solve problems involving sides and angles of polygons.

5. Construct quadrilaterals.

6. Prove theorems involving properties of quadrilaterals

F. Similarities

The student will be able to:

1. Express a ratio of 2 given measures in simplest terms.

2. Write a proportion, identify its terms, and apply the properties of proportions.

3. Identify and prove similarity of polygons.

4. Use theorem and corollaries for similarity to prove statements concerning line segments and products of line segments

G. Pythagorean Theorem

The student will be able to:

1. Compute the length of the third side of a triangle, given the lengths of its other two sides by using the Pythagorean Theorem.

2. Determine if a triangle is a right triangle by applying the Pythogorean Theorem.

3. Develop the theorems for special right triangles by using the Pythagorean Theorem.

4. Construct proofs and solve problems that require the use of the Pythogorean Theorem.

H. Circles

The student will be able to:

1. Identify parts of a circle
2. Identify lines and line segments related to circles.
3. Identify angles related to circles.
4. Solve problems involving lines and line segments related to circles.
5. Solve problems involving angles and arcs related to circles.
6. Determine the center of an inscribed or circumscribed circle, using appropriate geometric tools.
7. Apply theorems and corollaries in constructing proofs that involve circles.

I. Areas and Volumes

The student will be able to:

1. State and apply formulas in finding areas and perimeters of specified polygons.
2. State and apply formulas in finding area and circumference of a circle.
3. State and apply formulas in finding areas of specified solids.
4. State and apply formulas in finding volumes of specified solids.

446

ALGEBRA II

A. Solving Linear Equations

B. Factoring Polynomials

C. Working with Algebraic Fractions

D. Solving Systems

E. Working with Exponents, Radicals and Complex Numbers

F. Working with Quadratic Functions

G. Graphing and Solving Problems with Quadratic Relations

H. Graphing and Using Exponential and Logarithmic Functions

I. Working with Sequences and Series

ALGEBRA II

A. Solving Linear Equations

The Algebra II student will be able to:

1. Given a sufficient number of examples, identify the properties of real numbers used in each.
2. Use the properties of real numbers in writing expressions.
3. Given the set of rational numbers, perform the basic operations with them.
4. Perform the basic operations on a given set of polynomials.
5. Given appropriate set of literal equations, solve for any indicated variable.
6. Solve first degree equations or inequalities in one variable, given the equations in any form.
7. Given a group of first degree equations and inequalities, graph the solutions of a number line.
8. Solve verbal problems involving simple linear equations.

B. Factoring Polynomials

The Algebra II student will be able to:

1. Given a set of polynomial factors, find the products.
2. Find products of binomial factors by using the Binomial Theorem.
3. Find common monomial factors by using the distributive law on a group of polynomials.
4. Given polynomials of the form $x^n \pm y^n$, find the factors.
5. Find the factors of a perfect square trinomial.
6. Find the factors of the general trinomial.
7. Factor polynomials, given those of the form with terms that need grouping in order to be placed in factorable form.

8. Evaluate given polynomials by making numerical substitutions for the variable.

9. Apply the Remainder Theorem to given polynomials.

10. Apply the Factor Theorem to given polynomials.

11. Solve polynomial equations and inequalities by factoring.

12. Solve verbal problems which require factoring in finding their solutions.

C. Working with Algebraic Fractions

The Algebra II student will be able to:

1. Simplify rational expressions with integral exponents.

2. Multiply and divide rational expressions.

3. Find the Least Common Multiple of algebraic expressions.

4. Find sums and differences of algebraic expressions.

5. Simplify algebraic expressions involving combinations of operations, as in complex fractions.

6. Solve equations and inequalities involving fractions.

7. Solve verbal problems involving fractions.

D. Solving Systems

The Algebra II student will be able to:

1. Graph relations, given the set of ordered pairs or equations.

2. Given graphs and/or equations, determine which relations are functions.

3. Transform the equation of a line in general form to slope-intercept form.

4. Determine the slope of a function, given an equation, a graph or two points.

5. Given a function, determine the x and y intercepts.

6. Draw graphs, given the equation of a line.

7. Given sufficient conditions, write the equation of a line.

8. Find the solution of a linear system by graphing.

9. Given a linear system, determine the nature of the solution by inspection.

10. Evaluate determinants.

11. Solve a linear system with two variables by linear combinations, substitutions and determinants.

12. Solve linear systems with three variables.

13. Solve verbal problems whose solutions require systems.

E. Working with Exponents, Radicals and Complex Numbers

The Algebra II student will be able to:

1. Given a set of expressions, distinguish between the rationals and irrationals.

2. Write radical expressions using rational exponents and vice-versa.

3. Given an appropriate set of numbers, distinguish between real and imaginary numbers.

4. Given a group of radical expressions over the complex number system, simplify each.

5. Solve equations involving radicals over the complex number system.

F. Working with Quadratic Functions

The Algebra II student will be able to:

1. Given a quadratic equation, complete the square for finding the solution and for transforming the equation to the form $y = a(x-h)^2+k$.

2. Given the equation of a parabola, find the equation of the axis of symmetry of the parabola.

3. Find the maximum or minimum value of a given function.

4. Given a quadratic function, determine an appropriate table for graphing the function.

5. Solve quadratic equations by graphing.

6. Solve quadratic equations by factoring.

7. Use the quadratic formula to solve quadratic equations.

8. Solve verbal problems involving quadratic equations.

G. Graphing and Solving Problems with Quadratic Relations

The Algebra II student will be able to:

1. Given the coordinates of two points, state and apply the distance formula.

2. Given sufficient conditions, write equations of circles, ellipses, hyperbolae, parabolas.

3. Given appropriate equations, sketch the circle, hyperbola, ellipse and parabola.

4. Given a set of equations, distinguish between the linear equation, equation of a circle, hyperbola, ellipse and parabola.

5. Solve quadratic systems with one linear and one quadratic equation and with two quadratic equations.

6. Solve verbal problems involving quadratic systems, inverse variation and joint variation.

H. Graphing and Using Exponential and Logarithmic Functions

The Algebra II student will be able to:

1. Solve selected problems that require operations with exponents.

2. Write radical expressions using rational exponents and vice versa.

3. Given a function, write its inverse.

4. Transform an exponential equation to logarithmic form and vice versa.

5. Graph exponential and logarithmic functions.

6. Apply the laws of logarithms to compute products, quotients, powers and roots.

7. Solve exponential equations.

451

I. Working with Sequences and Series

The Algebra II student will be able to:

1. Given sufficient conditions, determine a specified term of an arithmetic sequence.
2. Given sufficient conditions, determine a specified term of an arithmetic series.
3. Given sufficient conditions determine a specified term of a geometric sequence.
4. Given sufficient conditions, determine a specified term of a geometric series.
5. Distinguish between arithmetic and geometric series and sequences.

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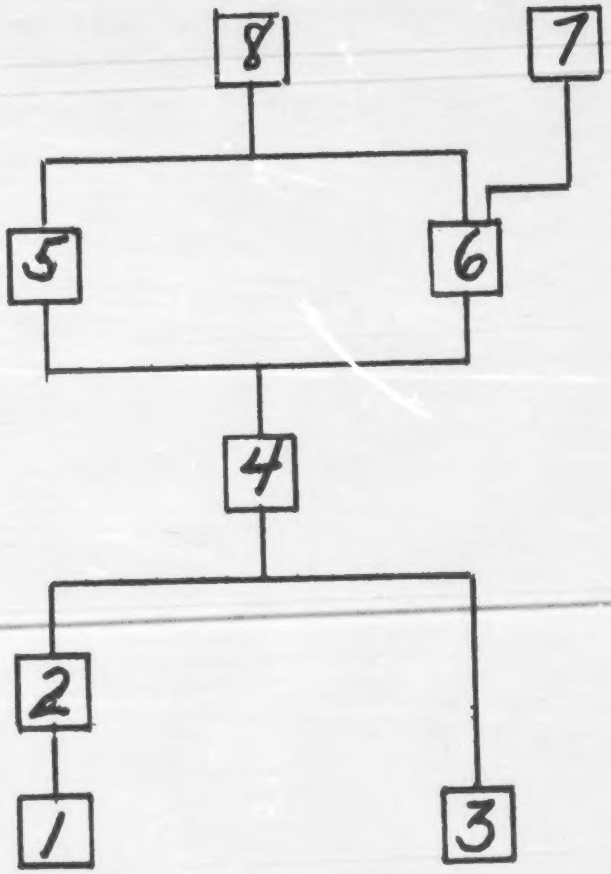

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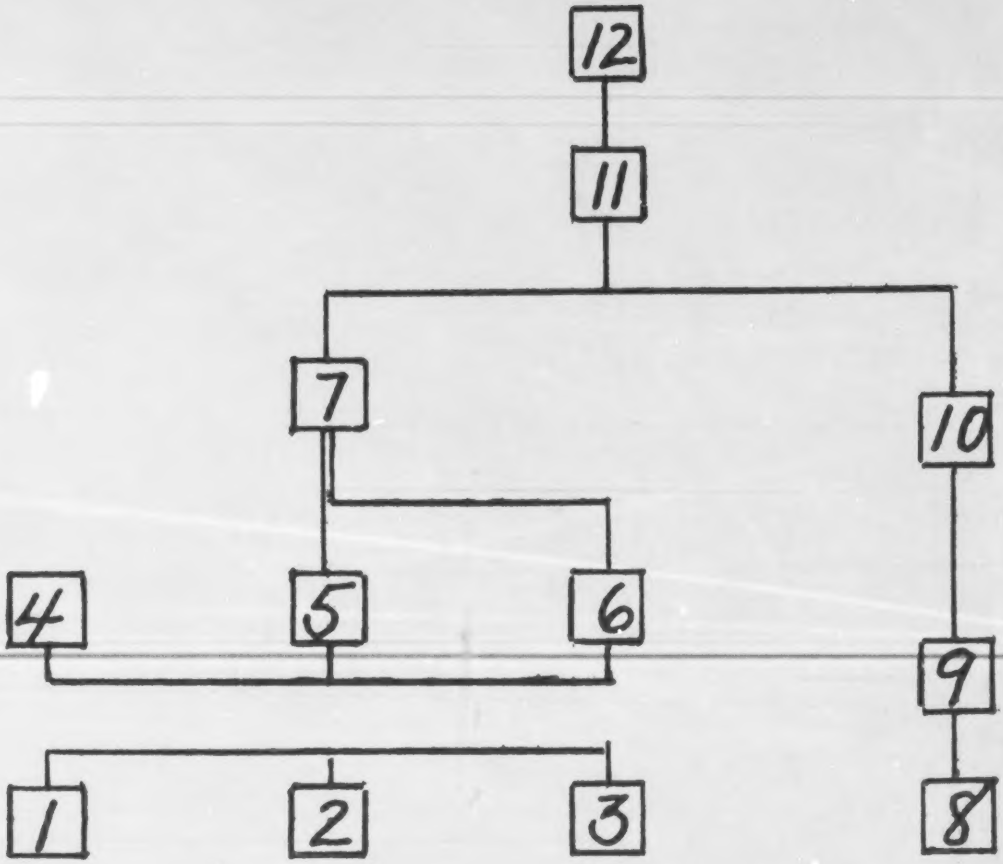
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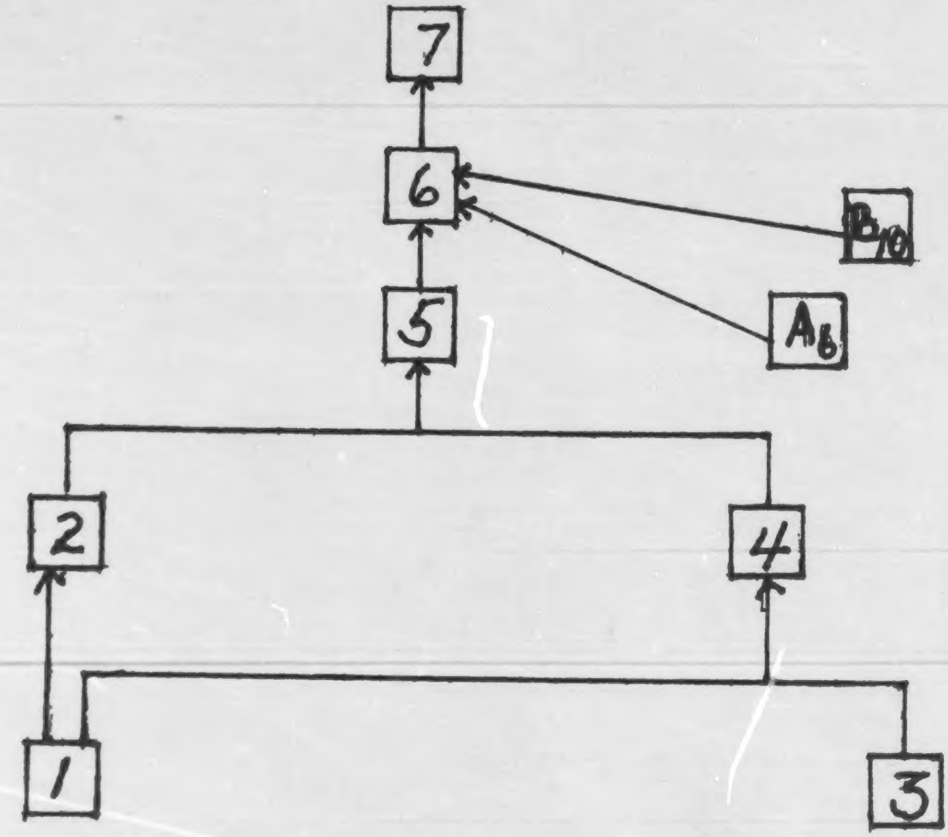
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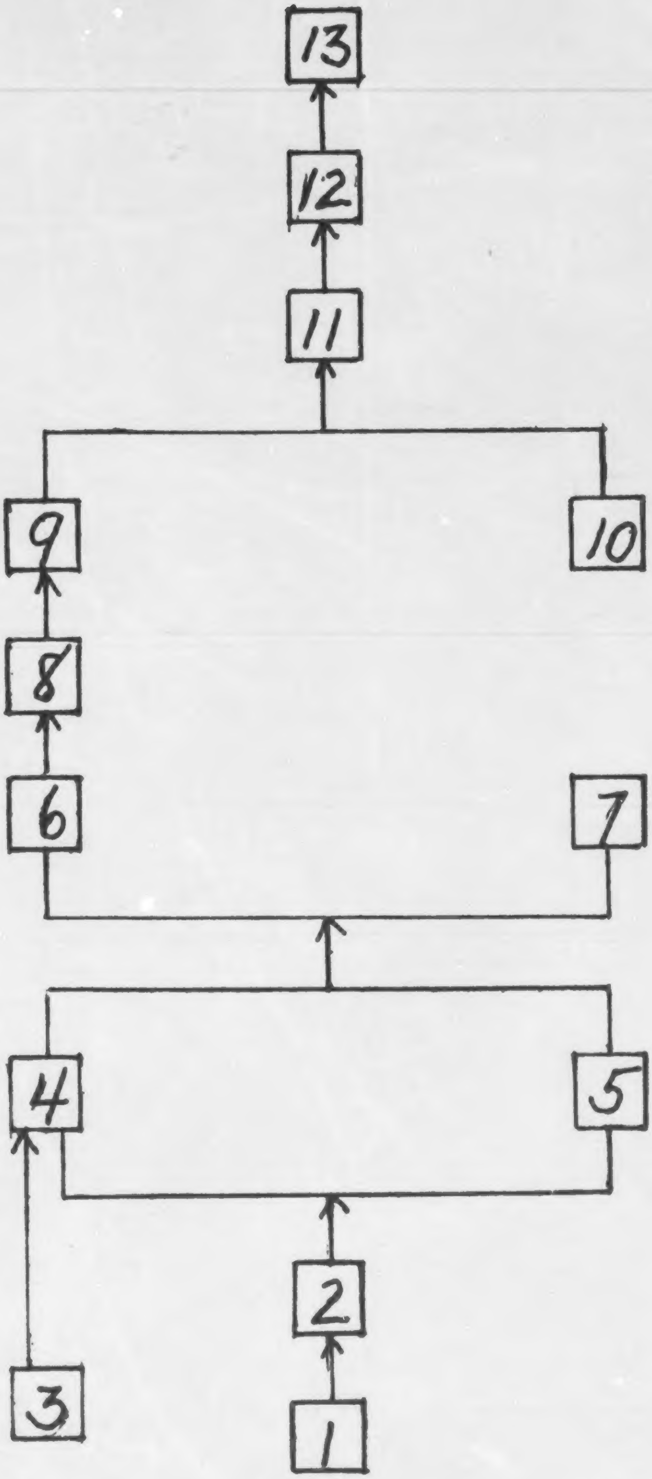
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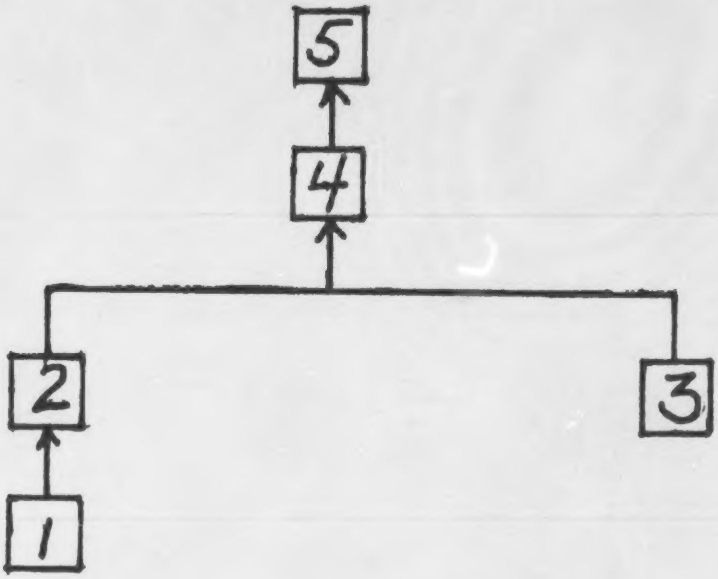

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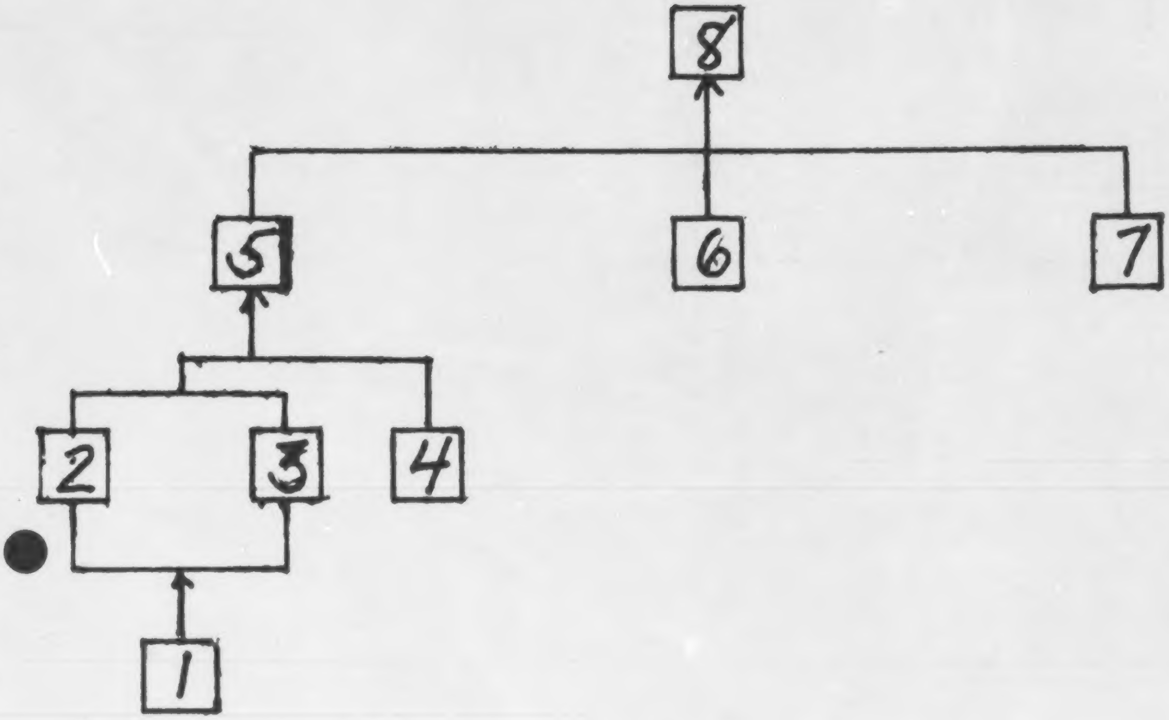

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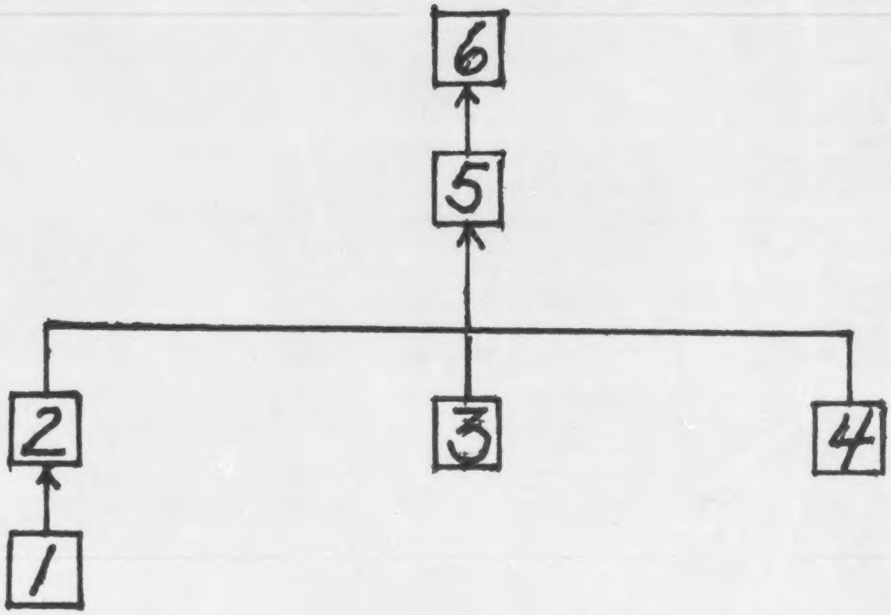

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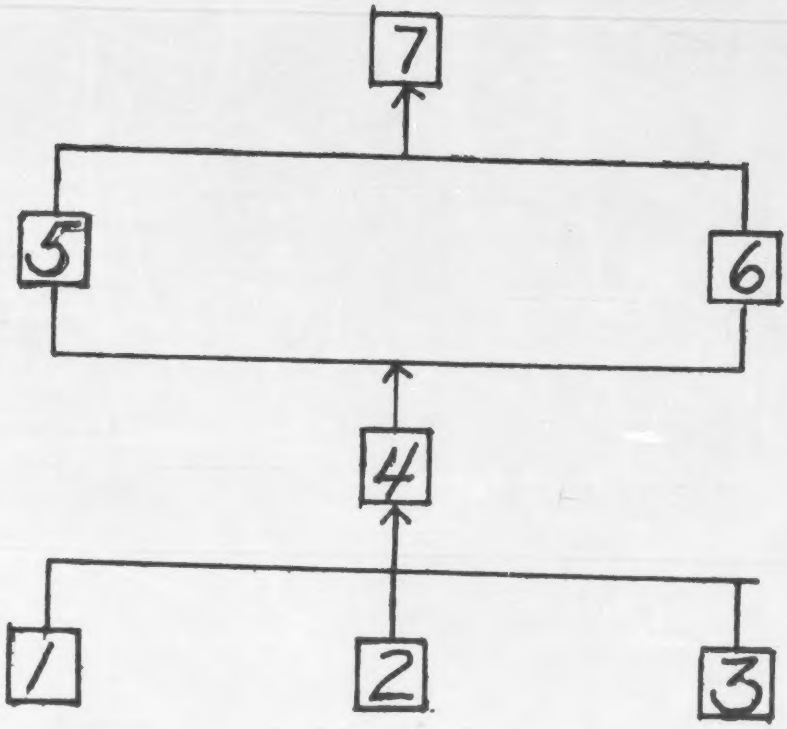

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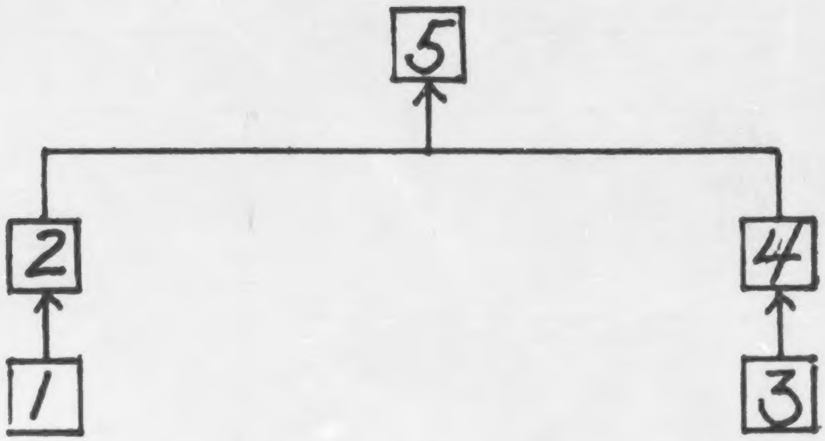


TRIGONOMETRY

Course Description

This course covers an in-depth study of angles, triangles, and circular functions. It deals with systems such as complex numbers, vectors, etc. and all the operations on these sets. The functions and their inverses are graphed. A student must have completed Algebra II successfully in order to study this course.

Mathematics 435 TRIGONOMETRY

Objectives

At the completion of this course the student will be able to:

1. Recognize angles in standard position on the coordinate plane and in triangles.
2. Memorize the trigonometric functions of angles as ratios in a triangle and as ratios involving points on a unit circle and the radius of the circle.
3. Demonstrate the quick and correct use of the table of values of the trigonometric functions.
4. Convert the size of an angle from degree measure to radian measure and vice versa.
5. Find the functions of special angles as 0°, 30°, 45°, 90°, 180°, etc., without tables.
6. Find the trigonometric functions of angles of any size or measure using the form $(k \cdot 90 \pm \alpha)$ and reference angles.
7. Solve problems requiring construction of right triangles and computations with trigonometric functions.
8. Derive the Cosine Law by using the distance formula.
9. Derive the Law of Sines.
10. Solve triangles.
11. Name the fundamental identities of trigonometry as, the reciprocal relations, the Pythagorean relations, cofunctions.
12. Transform identities by selecting the correct substitution from functions of $(\alpha \pm B)$, 2α, and $\alpha/2$.
13. Prove identity equations.
14. Graph the circular functions and their inverses.
15. Define the circular relations and functions.

16. Choose the correct trigonometric function or law to solve problems involving forces, and vectors.

17. Find areas of triangles using the trigonometric functions.

18. Solve trigonometric equations and write the solution sets in terms of the inverse functions.

19. Define a system of vectors and perform operations with them.

20. Use vectors, polar coordinates, and polar forms of complex numbers to find solutions to selected problems.

21. Define a polar coordinate system.

22. Operate with complex numbers.

23. Find roots and powers of complex numbers using De Moivre's Theorem.

24. Develop the sine and cosine series using De Moivre's Theorem.

25. Graph compound trigonometric functions using either the method of adding ordinates or that of multiplying ordinates.

26. Graph curves with parametric equations, first eliminating the parameter.

* 27. Write polar forms of lines, parabolas, hyperbolas, and ellipses.

* Optional

Mathematics 437

COLLEGE ALGEBRA

Course Description

This course deals with mathematical systems, operations with their elements, solutions of problems involving the members of these systems and graphing some members. Equations of higher degree are studied, solved, and graphed. To aid in the latter students will find derivatives, preparing them for later work in Calculus. Limits are included in the outline as well as probability and some analytic geometry is offered as optional topics. Algebra II and Trigonometry should be studied before this course.

Mathematics 437 COLLEGE ALGEBRA

Objectives

At the completion of this course the student will be able to:

1. Write the distinguishing properties of a mathematical system.
2. Perform the basic operations on elements from the set of Reals, the set of Complex numbers, and the Vector set.
3. Identify linear functions and inequalities and construct their graphs.
4. Define relations and functions.
5. Identify the domain and range of a function.
6. Locate points, represented by ordered pairs, in a coordinate plane.
7. Find the distance between any two points in a plane.
8. Identify the slope of a line, the inclination of a line, and the tangent of inclination.
9. State the general equation of a line and find the intercepts and slope with the equation in this form.
10. Write the equation of a line in intercept form, slope-intercept form, and two-point form.
11. Name the degree of non-linear equations.
12. Find the solution sets of equations of higher degree using several methods such as, factoring, synthetic division, iteration, root approximation, etc.
13. Apply the Factor and Remainder Theorems in analyzing equations and finding their factors and roots.
14. State the Fundamental Theorem of Algebra.
15. Apply Descartes' Rule of Signs and the Rational Root Theorem as aids in finding roots or to help in describing the nature of the roots.

466

16. Find the greatest lower and least upper limits of the zeros of various functions.

17. Find the derivative of a function as defined by $\lim \frac{\Delta y}{\Delta x}$.

18. Interpret the derivative as the slope of the curve.

19. Find the slope of the tangent to given points of the curve.

20. Find an equation of a tangent to a given point on a curve.

21. Find maximum and minimum points in graphing a relation or function using horizontal tangents.

22. Graph curves using symmetry, roots, extreme values, horizontal tangents, etc.

23. Compute with logarithms, slide rules, and calculators.

24. Graph linear inequalities, second degree inequalities, and systems of inequalities, including an appropriate number involving absolute value.

25. Graph polygonal convex sets and find the maximum and minimum values of these sets defined for some functions related to the graphed set.

26. Write sets of inequalities describing conditions given in a linear programming problem, graph the set, write the function needed to derive the information needed from the graph, and give the best solution possible under the given conditions.

27. Find sums, means, and general terms of arithmetic and geometric sequences and series.

28. Distinguish between arithmetic and geometric sequences and choose the proper formulas to use to solve problems involving them.

29. Find limits of sums of infinite geometric series.

30. Determine convergence and divergence of infinite series of various types by comparison with the p-series or other known series, and by use of the ratio test for convergence.

31. Simplify problems involving factorial notation.

32. Expand any binomial to any power and find any term in such an expansion using the Binomial Theorem.

33. Expand a binomial using Pascal's Triangle.

34. Prove the Binomial Theorem and other theorems concerning the natural numbers by mathematical induction.

35. Find the number of permutations of _n_ things taken _r_ at a time.

36. Find the number of combinations of _n_ things taken _r_ at a time.

37. Express the probability of a certain given event by using a fraction.

38. List all possible outcomes of an event and find the probability of each outcome if all are equally likely or not equally likely.

39. Solve problems involving independent events and the product of probabilities.

40. Solve problems involving mutually exclusive events and the sum of probabilities.

41. Apply the Binomial Theorem to certain probability problems.

42. Change an algebraic, complex, trigonometric, or exponential form of a number to any one of the other forms.

43. Add, multiply, and divide complex numbers in trigonometric form.

44. Find roots and powers of complex numbers using De Moivre's Theorem.

45. Simplify problems involving Euler's formulas.

* 46. Identify families of lines, transform linear equations to normal and polar form, and find the distance from a line to a point.

* 47. Identify systems of circles and the radical axis; write the polar form of the equation of a circle; and determine equations of these curves from definitions.

* 48. Write the equation of the parabola from the definition, translate the axes of the parabola in the plane, and write the polar form of the equation of the parabola.

* 49. Write the polar forms of the equations of the hyperbola and ellipse.

* Optional

Mathematics 438

UNIFIED COLLEGE ALGEBRA AND TRIGONOMETRY

Course Description

This course covers ropics included in the two separately offered courses of Trigonometry and College Algebra with Trigonometry interwoven. It is a full year's study of higher degree equations, circular functions, and systems. Graphs are made of trigonometric functions and relations, equations of 1st, 2nd, 3rd, and higher degrees, and circular functions. Limits, series, and probability are included. Algebra II is the prerequisite course.

Mathematics 438

UNIFIED COLLEGE
ALGEBRA AND TRIGONOMETRY
Objectives

At the completion of this course the student will be able to:

1. Write the distinguishing properties of a mathematical system, e.g., group, field.
2. Perform the basic operations with elements from the sets of real numbers, complex numbers, and vectors.
3. Identify linear functions and inequalities and construct their graphs.
4. Define and identify relations and functions.
5. Name the domain and range of a function.
6. Locate points, represented by ordered pairs, in a coordinate plane.
7. Find the distance between any two points in the plane.
8. Identify the slope of a line, the inclination of a line, and the tangent of inclination.
9. State the general equation of a line and find the intercepts and slope with the equation in this form.
10. Write the equation of a line in intercept form, slope-intercept form, and two-point form.
11. Name the degree of equations that are not linear. (Non-linear equations)
12. Find the solution sets of equations of higher degree using several methods as, factoring, synthetic division, iteration, root approximation, etc.
13. Apply the Factor and Remainder Theorems in analyzing equations and finding their factors and roots.
14. State the Fundamental Theorem of Algebra.

15. Apply Descartes' Rule of Signs and the Rational Root Theorem to aid in finding roots or to help in describing the nature of the roots.

16. Find the greatest lower and least upper limits of the zeros of various functions.

17. Find the derivative of a function as defined by lim $\frac{\Delta y}{\Delta x}$.

18. Interpret the derivative as the slope of the curve.

19. Find the slope of the tangent to given points of the curve.

20. Find an equation of a tangent to a given point on a curve.

21. Find maximum and minimum points in graphing a relation or function using horizontal tangents.

22. Graph curves using symmetry, roots, extreme values, horizontal tangents, etc.

23. Compute with logarithms, slide rules, and calculators.

24. Identify angles in triangles and angles as rotations in a plane.

25. Name the trigonometric functions of angles as ratios in a triangle and as ratios involving points on a unit circle and the radius of the circle.

26. Find the functions of special angles as, 0°, 30°, 45°, 90°, 180°, etc., without tables.

27. Graphically represent the trigonometric functions in a unit circle.

28. Demonstrate the quick and correct use of the table of natural values of the trigonometric functions.

29. Find the amplitude and period of trigonometric functions.

30. Graph the trigonometric functions in a coordinate plane.

31. Graph compound functions using either the method of adding ordinates or that of multiplying ordinates.

32. State the fundamental identities of trigonometry, such as the reciprocal relations, the Pythagorean relations, cofunctions.

33. Transform identities by selecting the correct substitution from functions of $(\alpha \pm B)$, 2α, and $\frac{\alpha}{2}$.

34. Solve trigonometric equations with properly selected identities.

35. Convert the degree measure of an angle to radian measure, and conversely.

36. Find the trigonometric functions of angles of any size or measure using the form $(k^{\circ} 90 \pm \alpha)$ and reference angles.

37. Find the length of an arc of a circle.

38. Analyze a problem and solve by the Law of Sines or Law of Cosines, as appropriate.

39. Choose the correct trigonometric function or Law to solve problems involving forces, vectors, and solutions of triangles.

40. Identify angles of depression and angles of elevation.

41. Find areas of triangles using the trigonometric functions.

42. Solve trigonometric equations and write the solution sets in terms of the inverse functions.

43. Write the principal values of the inverse functions and expand these to the general values of the inverse relations.

44. Graph the inverse relations and indicate the interval for principal values of the function.

45. Graph linear inequalities, second degree inequalities, and systems of inequalities, including an appropriate number involving absolute value.

46. Graph polygonal convex sets and find the maximum and minimum values of these sets defined for some function related to the graphed set.

47. Write sets of inequalities describing conditions given in a linear programming problem, graph the set, write the function needed to derive the information needed from the graph, and give the best solution possible under the given conditions.

48. Find sums, means, and general terms of arithmetic and geometric sequences and series.

49. Distinguish between arithmetic and geometric sequences and choose the proper formulas for solving problems involving them.

50. Find limits of sums of infinite geometric series.

51. Determine convergence and divergence of infinite series of various types by comparison with the p-series or other known series, and by use of the ratio test for convergence.

52. Simplify problems involving factorial notation.

53. Expand any binomial to any power and find any term in such an expansion by using the Binomial Theorem.

54. Expand a binomial using Pascal's Triangle.

55. Prove the Binomial Theorem and other theorems concerning the natural numbers by mathematical induction.

56. Find the number of permutations of n things taken r at a time.

57. Find the number of combinations of n things taken r at a time.

58. Use a fraction to express the probability of a certain given event.

59. List all possible outcomes of an event and find the probability of each outcome if all are equally likely or not equally likely.

60. Solve problems involving mutually exclusive events and the sum of probabilities.

61. Solve problems involving independent events and the product of probabilities.

62. Apply the Binomial Theorem to certain probability problems.

63. Change an algebraic, complex, trigonometric, or exponential form of a number to any one of the other forms.

64. Add, multiply, and divide complex numbers in trigonometric form.

65. Find roots and powers of complex numbers using De Moivre's Theorem.

66. Develop the sine and cosine series using De Moivre's Theorem.

67. Simplify problems involving Euler's formulas.

* 68. Identify families of lines, transform linear equations to normal and polar form, and find the distance from a line to a point.

* 69. Identify systems of circles and the radical axis; write the polar form of the equation of a circle; and determine equations of these curves from definitions.

* 70. Write the equation of the parabola from the definition, translate the axis of the parabola in the plane, and write the polar form of the equation of the parabola.

* 71. Write the polar forms of the equations of the hyperbola and ellipse.

* Optional

474

Mathematics 444

ELEMENTARY FUNCTIONS AND ANALYTIC GEOMETRY

Objectives

At the completion of this course the student will be able to:

1. Define a function as a set of ordered pairs with no first element alike or repeated and as a mapping.
2. Perform operations on functions: addition, subtraction, multiplication, division, and composition.
3. Describe the effect on $f(x)$ of compositions such as $f(x + h)$, $f(kx)$ and multiplication $kf(x)$ and addition $f(x) + k$, graph these compositions, and identify congruence, similarity, and position.
4. Find the inverse of a function, f-1, and graph a function, f, and its inverse, f-1.
5. Determine the algebraic properties of the system of functions under the operations.
6. Write the equation of a line given an appropriate set of conditions.
7. Solve polynomial equations using the Factor Theorem and the Rational Root Theorem.
8. Define the limit of a function.
9. Find the limit of a given function.
10. Define and identify continuous functions.
11. Write intervals of continuity and discontinuity of functions.
12. Define derivative of a function.
13. Apply concept of derivative of a function in:
    - a. Writing the equation of a tangent to the curve at a given point
    - b. Graphing polynomial functions
    - c. Solving problems involving extreme values and related rates.

14. Find the derivative of a product and quotient of 2 functions.

15. Apply the Chain Rule in finding derivatives of compositions of functions.

16. Differentiate implicit relations.

17. Define $y = \ln x$ as area under the graph of $y = 1/t$ from $t = 1$ to $t = x$ and its inverse $y = e^x$.

18. Graph $y = \ln x$ and $y = e^x$ and find their derivatives.

19. Describe the concept of the anti-derivative.

20. Solve simple differential equations.

21. Apply indefinite integration to growth and decay problems.

22. Differentiate and integrate circular functions.

23. Define inverses of circular functions.

24. Differentiate inverses of circular functions.

25. Use derivatives of inverses of circular functions to integrate (straightforward anti-derivatives).

26. Integrate functions using derivatives of inverses of circular functions when appropriate.

27. Define and illustrate the Fundamental Theorem of Calculus.

Mathematics 453

CALCULUS

Course Description

This course begins with a study of number systems. It contains a general review of such things as slope, distance in a plane, linear equations and inequalities, graphs, definitions of domain and range. Increasing and decreasing functions are analyzed, limits are found, formulas are derived, beginning with those for derivatives. Derivatives are found and used in problems involving rates, velocities, etc. A number of differential equations are solved to introduce integration. Selected problems on areas, distances, volumes, etc. are integrated by different methods. A student must complete successfully College Algebra and Trigonometry (or the equivalent) before entering this course.

Mathematics 453

CALCULUS
Objectives

At the completion of this course the student will be able to:

1. Name all number systems and describe their properties.
2. Identify one-to-one correspondence between points in the plane and pairs of numbers (x,y).
3. Find distances in a plane between any two points, recognizing Δy as $y_2 - y_1$ and Δx as $x_2 - x_1$.
4. Define the slope of a straight line in terms of $\Delta y / \Delta x$.
5. Transform any form of the equation of a straight line into other forms.
6. Graph first and second degree inequalities, some of which involve absolute value.
7. Find absolute value of sums, products, quotients, and differences.
8. Describe intervals and neighborhoods in specified examples.
9. Define relations, functions, domain, and range and identify each in problems.
10. Alter graphs by translation of axes.
11. Determine if a function is increasing or decreasing in given intervals.
12. Discover new interpretation of Δy and Δx as they now apply to curves rather than straight lines.
13. Find limits of given functions.
14. Find slope functions for curves.
15. Derive the formula for the derivative of a function and write the different notation for this quantity.

16. Find rates and velocities using derivatives.

17. Choose the correct formula to find the derivative of a function, as for example, products, quotients, etc.

18. Solve problems with functions and their derivatives which involve rates, maxima, minima, and curve-plotting.

19. Solve problems using Rolle's Theorem.

20. Apply the Mean Value Theorem in solving selected problems.

21. Approximate values of roots and powers of numbers by using differentials.

22. Solve those differential equations necessary for beginning integration.

23. Perform the operation indicated by the integral sign in solving beginning problems in integration.

24. Evaluate C, the constant of integration, when given the necessary conditions.

25. Integrate problems involving sines and cosines.

26. Find the area under a curve by integration.

27. Find the area under a curve using the Trapezoidal Rule for approximating an integral.

28. Compute the area between two curves by integration.

29. Choose the correct method of integration to compute the distance a body travels along a curve in a given interval.

30. Find volumes of solids, including those generated by rotating curves about given axes, by writing a proper integrable function and integrating it.

31. Use the method of cylindrical shells to find the volumes of solids where other methods are not feasible.

32. Find the length of a plane curve after choosing the correct method of integration for the problem.

33. Compute the area of a surface of revolution.

34. Find the derivative of $y = lnxx$ and integrate problems where solutions involve natural logarithms.

35. Differentiate and integrate problems of the form $\frac{d}{dx} e^u = e^u \frac{du}{dx}$,

and $e^u du = e^u + C$.

36. Compute integrals involving integration by parts, partial fractions, and various substitutions on integrals with $ax^2 + bx + c$, $\sqrt{a^2 - u^2}$, etc.

37. Compute integrals involving even powers of sines and cosines.

Mathematics 454

INTRODUCTION TO COMPUTER PROGRAMMING

Course Description

Introduction to Computer Programming is basically a problem-solving course with computer applications. In addition to providing the student with a systematic approach to solving problems that arise in various fields, the course is designed to give the student a broad introduction to the world of digital computers.

INTRODUCTION TO COMPUTER PROGRAMMING

A. Operating a Terminal, Flowcharting Symbols and Programming, using READ, LET, PRINT and END Statements

B. Data Analysis and Programs Containing the INPUT Statement

C. Flowcharts and IF...THEN Statements Without Loops

D. The Trial-and-Error Technique and the IF...THEN Statement

E. Using String Variables

F. Modelling as a Problem-Solving Technique and the IF...THEN Statement in a Loop

G. Simulation in Problem-Solving and the FOR...NEXT Statement

H. REM and Formatted PRINT Statements

I. Elimination in Problem-Solving and Nested Loops

J. Historical Development of Computing Devices

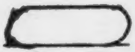
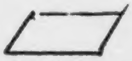
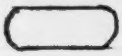
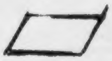
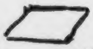
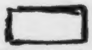
K. Computer-Related Careers

INTRODUCTION TO COMPUTER PROGRAMMING

Objectives

A. Operating a Terminal, Flowcharting Symbols and Programming using READ, LET, PRINT and END Statements

The Computer Programming student will be able to:

1. List procedures used in problem-solving (e.g., identify the problem, list data, write open sentences, compute answers, check).
2. Given a verbal problem, translate to a mathematical sentence (model).
3. Use problem-solving procedures to find an answer to a given verbal problem without using the computer.
4. Name the five components of a digital computer.
5. Operate a terminal using LOEON, LOGOFF, and RUN commands.
6. Given a BASIC program with PRINT and END statements and with the four operations (+, -, *, /) and grouping symbols, list the output.
7. Distinguish  and  as flowcharting symbols for termination and PRINT statements.
8. Given a flowchart with  and  symbols write a BASIC program.
9. After writing a BASIC program, RUN the program.
10. Translate E-notation into standard notation.
11. Verify computer output using estimation.
12. Draw a flowchart and write an accompanying program using PRINT and END statements; RUN the program and verify answers.
13. Given a BASIC program containing READ, LET PRINT and END statements, list the output.
14. Distinguish  and  as flowcharting symbols for READ...DATA and LET statements

15. Given a flowchart with , and symbols, write a BASIC program with READ...DATA, LET,PRINT and END statements and vice-versa.

16. Given a verbal problem, draw a flowchart and write an accompanying BASIC program which contains READ...DATA, LET, PRINT and END statements; RUN the program and verify output.

B. Data Analysis and Programs Containing the INPUT Statement

The Computer Programming student will be able to:

1. Given a verbal problem, translate to a mathematical sentence (model).

2. Solve data-sufficiency problems.

3. Given a problem, analyze the data and induce other facts necessary to the solution of the problem.

4. Given a flowchart with , and symbols, write a BASIC program with READ...DATA, LET, PRINT and END statements and vice-versa.

5. Given a flowchart containing an INPUT box, list the output and write an accompanying BASIC program.

6. Describe the composition of a computer memory.

7. Draw the binary representation of a whole number in memory.

8. Describe the function of editing commands: LIST, SAVE, UNSAVE; demonstrate error-correction procedures.

9. Given a demonstration program, make error-corrections and re-SAVE.

10. Compute the values of statements containing ABS, SQR, **, and INT functions (RND optional).

11. Given a verbal problem, use data-analysis and data-implication to construct an equation; draw a flowchart and write an accompanying BASIC program containing INPUT, LET, PRINT and END statements and various internal functions; RUN and SAVE the program.

5. Given a flowchart with an IF...THEN statement used as a switch in a loop, write a BASIC language program.

6. Given a verbal problem, incorporate the Trial-and-Error technique in a flowchart and a BASIC language program containing an IF...THEN statement; RUN the program.

E. Using String Variables

The Computer Programming student will be able to:

1. Given a verbal problem, use decision-making techniques to draw a flowchart and write an accompanying BASIC language program containing INPUT or READ...DATA, LET, IF...THEN, GO TO, PRINT and END statements; RUN the program.

2. Given a program using string (alphanumeric) variables, list the output.

3. Given a problem, draw a flowchart and write a program using string variables, a GO TO and an IF...THEN statement (< and > is optional with string variables); RUN the program.

F. Modelling as a Problem-Solving Technique and the IF...THEN Statement in a Loop

The Computer Programming student will be able to:

1. Given a verbal problem, translate it to a mathematical sentence (model).

2. Given a problem, use modelling (application of a specific case to the general principle) to find a solution.

3. Describe the composition of a computer memory.

4. Describe the meaning of "=" as " ← " (i.e., "x = y" means replace the contents of address $\underline{x}$ by the contents of address $\underline{y}$.)

5. Given a flowchart with an IF...THEN statement used as a switch in a loop, write an accompanying BASIC language program.

6. Given a flowchart with an iteration loop containing an IF...THEN statement, list the output and write an accompanying BASIC language program.

7. Given a verbal problem, use the modelling technique and the iterative process to draw a flowchart and write an accompanying BASIC language program containing an IF...THEN statement; RUN the program.

C. Flowcharts and IF...THEN Statements Without Loops

The Computer Programming student will be able to:

1. Given a verbal problem, translate to a mathematical sentence (model).
2. Given a set of questions, identify those which can be answered by "yes" or "no."
3. Given a BASIC program containing IF...THEN and GO TO statements, with $<$, $>$ and $=$ relations, list the output.
4. Given a flowchart containing an INPUT box, list the output and write an accompanying BASIC program.
5. Identify the ◇ as the flowcharting symbol for decisions and for IF...THEN statements.
6. Given a flowchart which contains at least one decision box, determine the next statement to be executed.
7. Given a flowchart with decision and input boxes, determine the output.
8. Given a flowchart with a decision box, write an accompanying BASIC language program with an IF...THEN statement and vice-versa.
9. Given a verbal problem use decision-making techniques to draw a flowchart and write an accompanying BASIC language program containing INPUT or READ...DATA, LET, IF...THEN, GO TO, PRINT and END statements; RUN the program.

D. The Trial-and-Error Technique and the IF...THEN Statement

The Computer Programming student will be able to:

1. Given a verbal problem, translate to a mathematical sentence (model).
2. Apply the Trial-and-Error technique to find the solution set of an open sentence.
3. Given a flowchart with a decision box, write an accompanying BASIC language program with an IF...THEN statement and vice-versa.
4. Given a flowchart with an IF...THEN statement used as a switch in a loop, list the output.

G. Simulation in Problem-Solving and the FOR...NEXT Statement

The Computer Programming student will be able to:

1. Given a verbal problem, translate it to a mathematical sentence (model).
2. Given a problem, use the iterative process to find a pattern and to construct an equation (model); simulate the process by testing the model; test the results by approximation.
3. Given a program with a FOR...NEXT statement, list the output.
4. Given a flowchart with an iteration loop containing an IF...THEN statement, list the output and write an accompanying BASIC language program.
5. Given a flowchart with a FOR...NEXT box, list the output. (Subscripts are optional.)
6. Given a flowchart with an IF...THEN box, draw an equivalent flowchart using a FOR...NEXT box and write an accompanying BASIC language program. (RND is optional).
7. Given an appropriate problem, use simulation to draw a flowchart and write an accompanying BASIC language program containing a FOR...NEXT statement; RUN the program.

H. REM and Formatted PRINT Statements

The Computer Programming student will be able to:

1. Given an appropriate problem, use simulation to draw a flowchart and write an accompanying BASIC language program containing a FOR...NEXT statement; RUN the program.
2. Given a program with REM statements and a formatted PRINT statement, list the output.
3. Given a program rewrite it using FOR...NEXT statements so that the PRINT statement is formatted and appropriate REM statements are inserted.

I. Elimination in Problem Solving and Nested Loops

The Computer Programming student will be able to:

1. Given a verbal problem, translate to a mathematical sentence. (model).

2. Given an appropriate problem, find a solution using the Process of Elimination.

3. Given an appropriate problem, use simulation to draw a flowchart and write an accompanying BASIC language program containing a FOR...NEXT statement; RUN the program.

4. Given a flowchart with nested FOR...NEXT loops, list the output.

5. Given a flowchart with nested FOR...NEXT loops, write an accompanying BASIC language program.

6. Given an appropriate problem, draw a flowchart with nested FOR... NEXT loops and write an accompanying program which employs the Process of Elimination; RUN the program.

J. Historical Development of Computing Devices

The Computer Programming student will be able to:

1. Calculate simple sums using an abacus.

2. Calculate simple products using the principle of Napier's rods.

3. Identify the accomplishments of persons instrumental in the development of the modern digital computer (e.g., Babbage, Hollerith, Von Neuman).

4. List in chronological order the persons, events and inventions involved in the development of today's digital computer.

K. Computer-Related Careers

The Computer Programming student will be able to:

1. List the skills required of a keypunch operator.

2. Identify the responsibilities of a Computer Operator.

3. Distinguish the responsibilities of the Keypunch Operator, the Computer Operator, the Computer Programmer and the Systems' Analyst.

4. Describe the use and limitations of computers in various fields: health, business (retail and industrial), scientific, education).

5. List computer-related career opportunities and their required skills in various fields.

6. Given a life-role problem related to the application of computers, list the problem-solving steps the Systems' Analyst would use.

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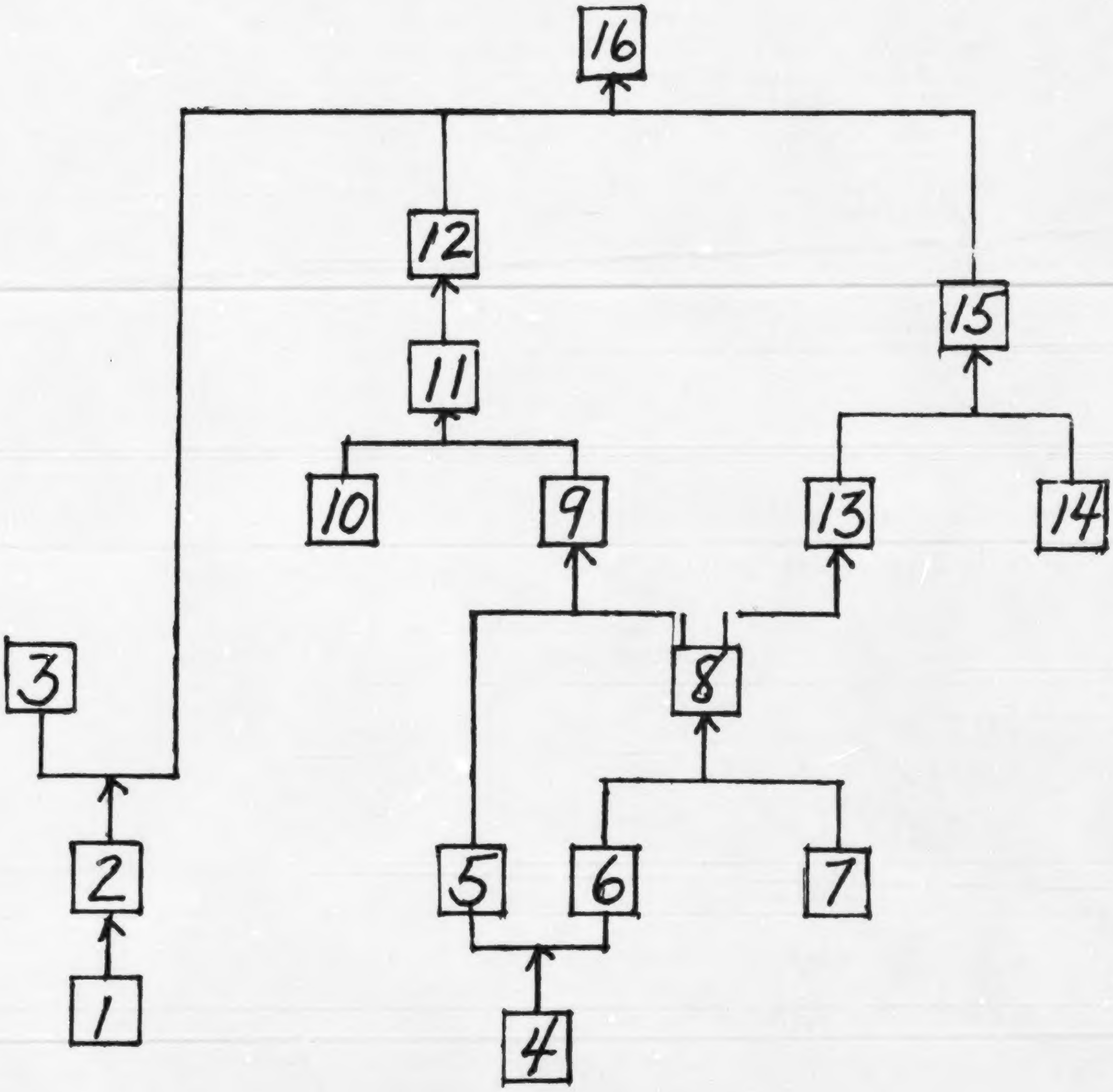
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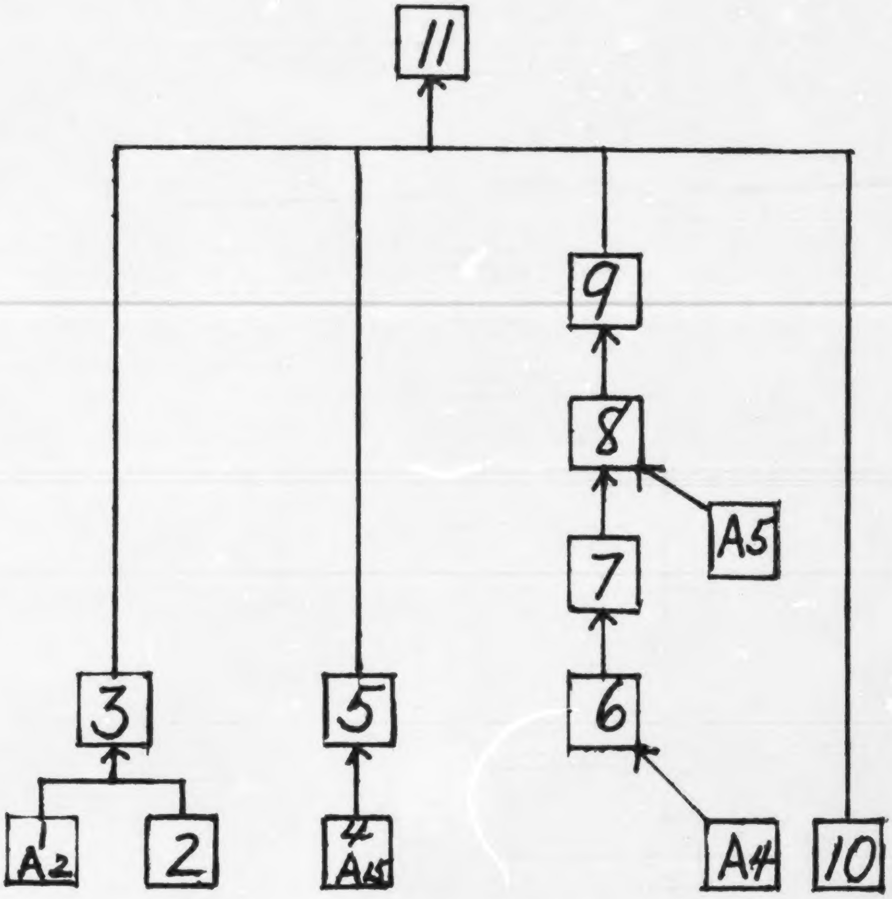
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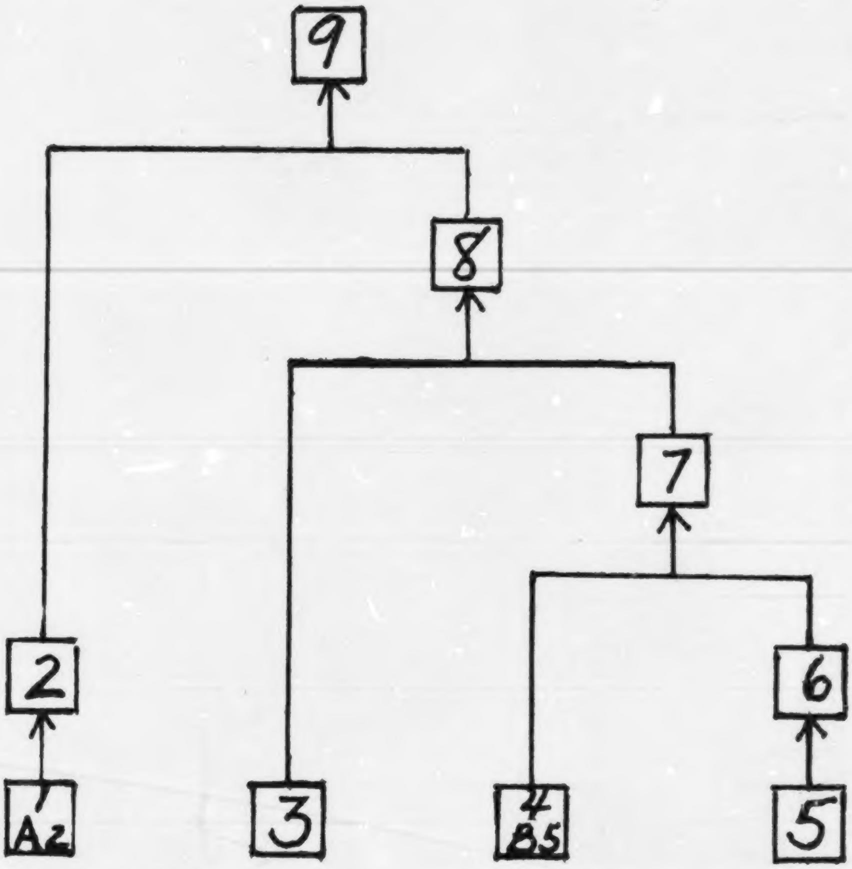
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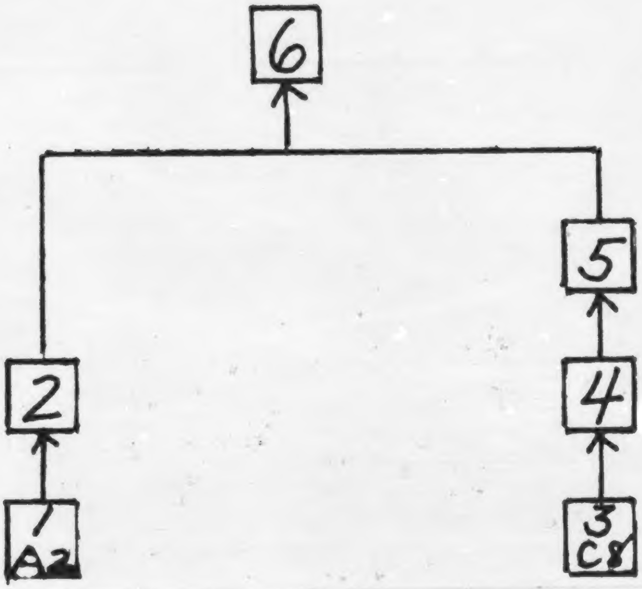
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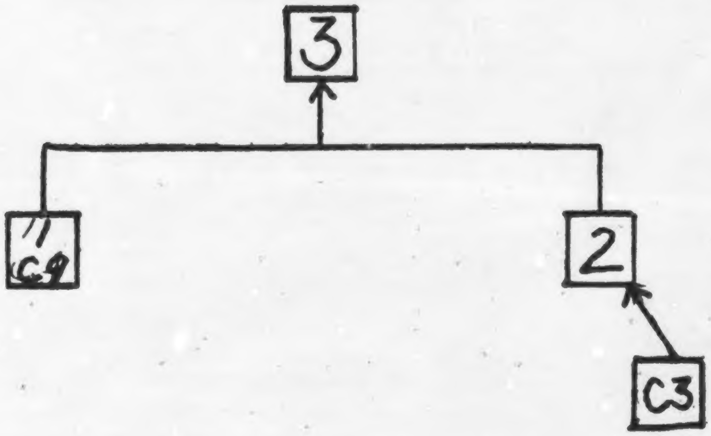

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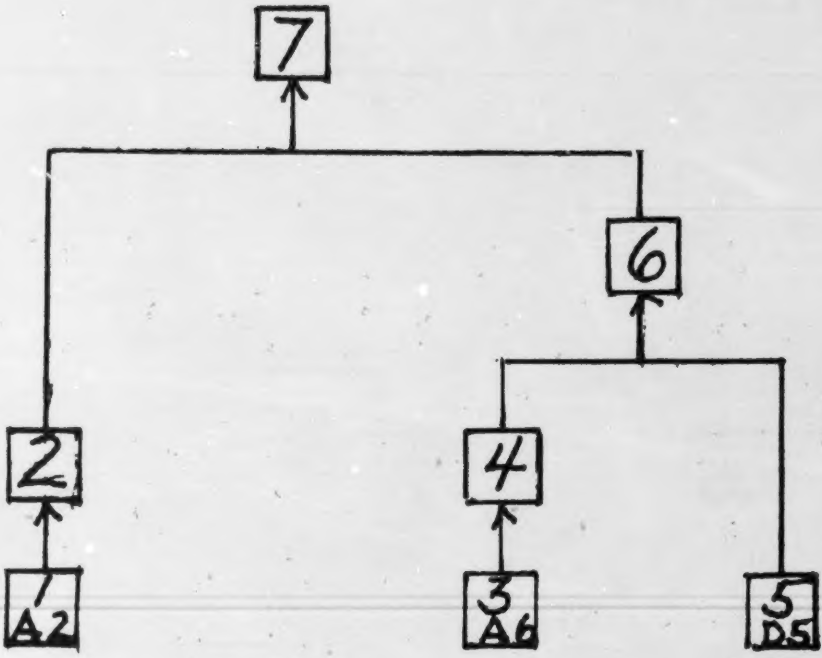
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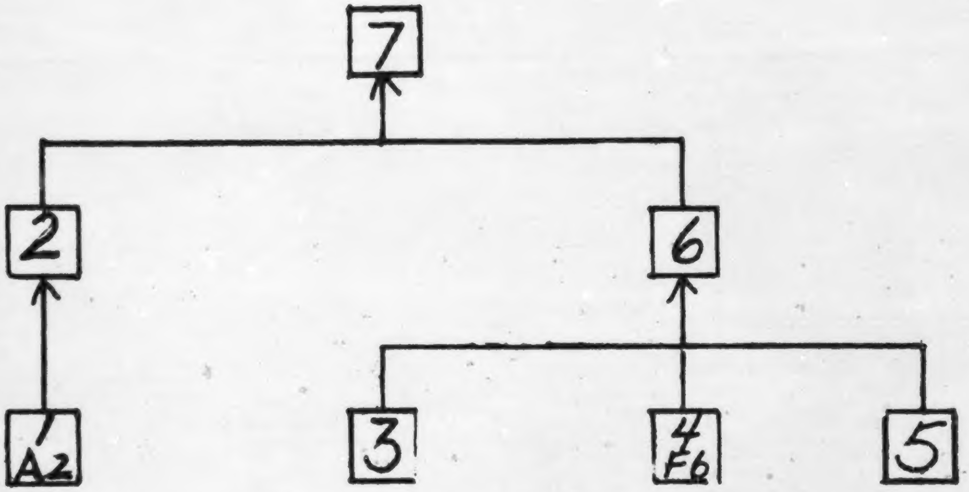
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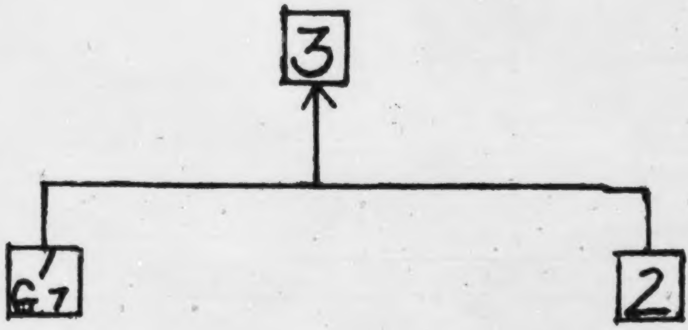

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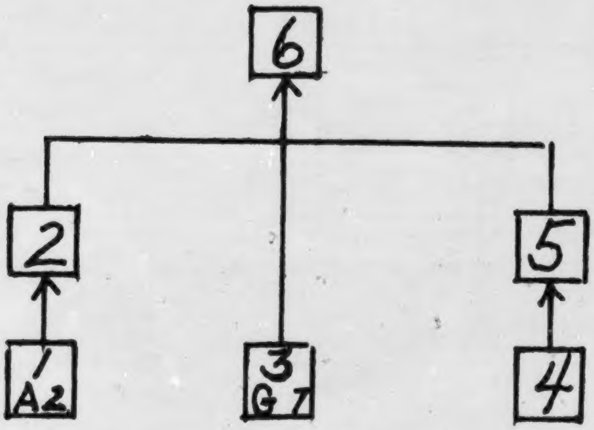
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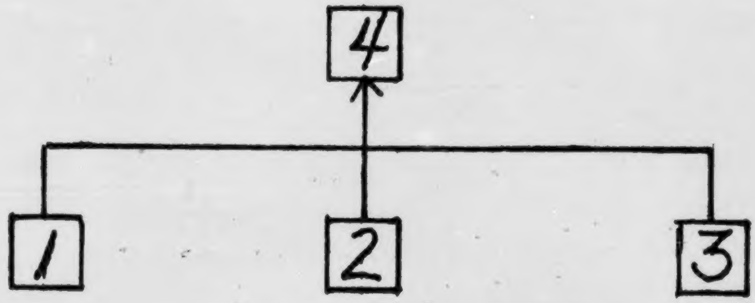

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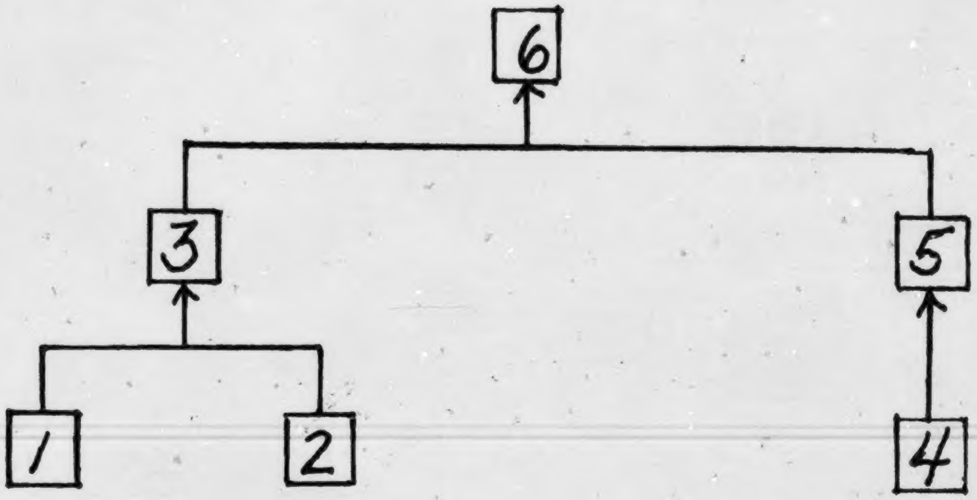

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COMPUTER MATHEMATICS

Course Description

This is a course in linear programming. Optimization problems from the natural, life, and social sciences as well as from the field of business are solved with the aid of the computer. The object of the course is to provide the student with the fundamental concepts used in modern decision-making processes. This course pre-supposes an ability to solve linear inequalities in at least three variables.

500

Mathematics 455 COMPUTER MATHEMATICS-Option I
Objectives

At the completion of this course the student will be able to:

1. Prepare a flowchart for solving a given problem.

2. Operate a terminal.

3. Write programs, using either B. A. S. I. C. or FORTRAN, which employ:

    a. Arithmetic statements that include built-in functions
    b. Input statements
    c. Output statements
    d. Remarks or comments
    e. Branching statements, including the conditional
    f. Iteration procedures including increment statements and do-type statements
    g. Matrix notation and computation and subscripts
    h. Subroutines.

4. Distinguish between variable types including exponential notation, floating point, and string.

5. Run programs using editing commands.

COMPUTER MATHEMATICS-Option II
Objectives

At the completion of this course the student will be able to:

1. Describe sets using set notation.
2. Classify sets as subsets, empty sets, finite or infinite sets, proper subsets, disjoint sets, equal sets, equivalent sets.
3. Perform operations of union and intersection on sets.
4. Construct flowcharts which demonstrate the Gaussian Elimination and Formula algorithms for solving systems of linear equations and inequalities in two variables.
5. Write programs, in either BASIC or FORTRAN, which use Gaussian Elimination and the Formula methods for solving linear equations and inequalities in two variables.
6. Find the solution to a linear programming problem which has as constraints linear inequalities in two variables by using the computer.
7. Describe the nature of a solution of a linear programming problem.
8. Construct a flowchart which describes the Gaussian Elimination algorithm for solving systems of linear equations and inequalities in any number of variables.
9. Write a program which uses Gaussian Elimination to solve linear equations and inequalities in any number of variables.
10. Construct a flowchart which describes the Simplex Method.
11. Write a program which uses the Simplex Method.
12. Use the Simplex Method on the computer to solve a linear programming problem which has at least three constraints.

ADVANCED TOPICS IN MATHEMATICS

Objectives

At the completion of this course the student will be able to:

1. Distinguish between inductive and deductive reasoning.
2. Use deductive method in proving mathematical statements.
3. Complete a given arithmetic, geometric, power, and Fibonacci sequence up to a specified number of terms.
4. Find the missing term in an arithmetic, geometric, power and Fibonacci sequence.
5. Identify a function expressed by:
   a. A set of ordered pairs
   b. A formula
   c. A graph.
6. Locate a point represented by an ordered pair, in a coordinate plane.
7. Find the range of a function, given the domain.
8. Graph relations and functions in forms such as $y = ax + b$, $y = ax^2$, $y = ax^3$, $y = ax^4$, and $y = a/x$.
9. Transform a given large number into scientific notation and conversely.
10. Find the logarithm of a number using a table, slide-rule, or calculator.
11. Find products and quotients using logarithms.
12. Determine if a given drawing, figure, or object is symmetric about a line or a point.
13. Define, illustrate and name polygons.
14. Identify and construct polyhedra models.

15. Identify a circle, ellipse, parabola and hyperbola, given a set of drawings.

16. Identify the major and minor axes in graphs of an ellipse.

17. Find illustrations of mathematical curves in nature.

18. Find the number of ways 2, 3, or 4 things can be arranged in different orders, using permutations and combinations, and factorial notation.

19. Find the number of ways 2, 3, or 4 things can be chosen from n things ($n \leq 6$), using permutations and combinations, and factorial notation.

20. Express the probability of a given event, using a fraction.

21. Construct and use Pascal's Triangle to find the number of all possible outcomes, or the binomial probability of a given outcome.

22. Find the probability of independent and dependent events.

23. Define and compute complementary probabilities.

24. Construct and use a frequency distribution table in answering questions about a set of data.

25. Distinguish among the three types of measures of central tendency.

26. Name the mean, median, and mode of a given set of data.

27. Compute the standard deviation of a given set of data.

28. Construct a line, bar, circle and a picture graph, given a set of data.

29. Use statistical graphs in finding needed information from a given set of data.

30. Describe sampling techniques in statistics.

31. Select appropriate sampling techniques for a given problem situation.

* 32. Define topology, networks, even or odd corners, trees, simple-closed curves, and topologically equivalent figures.

504

* 33. Identify networks as topologically equivalent, simple-closed curves, trees or three-dimensional.

* 34. Use networks in solving topological puzzles.

* Optional

PRELIMINARY DRAFT PRELIMINARY DRAFT

COMPETENCY BASED CURRICULUM

OBJECTIVES FOR SCIENCE

SENIOR HIGH SCHOOL

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

DR. VINCENT E. REED
SUPERINTENDENT
1978

TABLE OF CONTENTS

Preface..iii

Objectives for Laboratory Science..............................1

Objectives for Biology...9

Objectives for Chemistry......................................14

Objectives for Physics..18

Appendix..23

NOTE: All contents of this book are in very preliminary form. Teachers are urged to submit suggestions for deletions and changes.

OBJECTIVES FOR SENIOR HIGH SCIENCE

PREFACE

The senior high science program defines objectives that are to serve as a focal point of competency-based instruction. These objectives contribute to the development of specified competencies.

Competencies that constitute scientific literacy are to:

1. IDENTIFY THE KEY PRESENTED IN VARIOUS MEDIA.
2. ORGANIZE A BODY OF DATA INTO A STATEMENT WHICH WILL EFFECTIVELY CONVEY THE INFORMATION TO SOMEONE ELSE.
3. IDENTIFY THE VARIABLES IN A SIMPLE, PRACTICAL PROBLEM, AND ESTIMATE THE RELATIVE IMPORTANCE OF EACH VARIABLE.
4. MEASURE LENGTH, MASS, TIME, VOLUME AND TEMPERATURE USING COMMON METRIC UNITS.
5. DEMONSTRATE THE ABILITY TO THINK ANALYTICALLY ABOUT A SITUATION OR SET OF CONDITIONS BY:
    - (A) FORMULATING EXPECTED RESULTS BASED ON PREVIOUS EXPERIENCES.
    - (B) DESIGNING APPROPRIATE DATA-GATHERING PROCEDURE.
    - (C) GATHERING INFORMATION NEEDED TO TEST AN IDEA.
    - (D) WRITING LOGICAL STATEMENTS FROM A SET OF RELATED OBSERVATIONS.
6. EXHIBIT POSITIVE AND REALISTIC SELF-CONCEPTS BY:
    - (A) INVESTIGATION CAREER OPPORTUNITIES.
    - (B) DISCUSSING CRITICALLY ONE'S OWN ABILITIES NAD FUTURE PLANS.
7. CITE EVIDENCE OF SCIENTIFIC CHANGES IN SOCIETY THAT EFFECT HUMAN PHYSICAL AND MENTAL WELL-BEING.
8. EXHIBIT COMPETENCY IN APPLYING SCIENTIFIC REASONING TO DECISIONS WHICH MUST BE MADE IN REAL LIFE SITUATIONS, (E.G., ECONOMIC STABILITY, POPULATION PRESSURES, FAMILY DECISIONS, CAREER DECISIONS).
9. CITE AT LEAST FIVE CONTRIBUTIONS MADE BY MEMBERS OF DIFFERENT ETHNIC GROUPS TO THE SCIENTIFIC AND TECHNOLOGICAL PROGRESS OF OUR SOCIETY AND THE LARGER WORLD SOCIETY.

10. DEMONSTRATE THE ABILITY TO WORK AS A TEAM MEMBER IN A FACT-FINDING SITUATION BY:

    (A) FULFILLING A ROLE IN THE ON-GOING CONDUCT OF AN EXPERIMENT.

    (B) GIVEN RESULTS FROM AN EXPERIMENT," DETERMINING WHICH DATA DOES NOT FOLLOW THE MAJORITY OF DATA.

    (C) DISCUSSING CRITICALLY, POSSIBLE SOURCES OF ERROR IN AN EXPERIMENT.

    (D) COMPARING INFORMATION COLLECTED WITH THAT OF FELLOW STUDENTS.

    (E) SUGGESTING REASONS FOR SUPPORTING OR REJECTING A HYPOTHESIS BASED ON EXPERIMENTAL DATA.

11. CITE THE ROLES OF EXISTING GOVERNMENTAL AGENCIES RESPONSIBLE FOR MONITORING SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT WHICH AFFECT THE CONSUMER IN OUR SOCIETY.

12. DESCRIBE RECENT WORLD-WIDE SCIENTIFIC TECHNOLOGICAL DEVELOPMENTS WHICH HAVE AFFECTED LIVING CONDITIONS AND CITE EVIDENCES OF CHANGES RESULTING FROM SUCH DEVELOPMENTS.

13. GIVEN A LIST OF PURCHASE OPTIONS, COLLECT INFORMATION ON EACH OPTION AND DECIDE WHICH OPTION/S IS/ARE MORE ACCEPTABLE.

14. IDENTIFY HOBBIES AND OTHER LEISURE TIME ACTIVITIES WHICH ARE AVAILABLE TO PEOPLE INTERESTED IN SCIENCE.

OBJECTIVES FOR SENIOR HIGH COURSES

INTRODUCTION

The objectives for the four courses presented here are very preliminary indeed. The Curriculum committee writers have just begun their work and only first rough drafts have been done. A few teachers have had the opportunity to review these materials. Their comments will be incorporated into the next draft in the summer of 1978.

The intention of this publication is to offer these objectives to senior high science teachers so that they can become informed about the direction that science curriculum is taking, and so that they may review the objectives and make recommendations for future editions.

The present plan is to have the basic required science program established uniformly at the elementary and junior high levels and to offer electives at the senior high level. The laboratory science course will be designed as a pre-requisite to all senior high electives, and can be used to fulfill the present one credit graduation requirement.

None of the above information is final or definitive. In CBC Curriculum Model there is an opportunity for constant revision. Each of the elective courses will have objectives and assessment tasks, but none of these have been as yet prepared. Please offer your ideas and reactions to us so that the product will be satisfactory to all of us insofar as is possible.

ACKNOWLEDGEMENTS

These materials were prepared under the supervision of Mary B. Harbeck during the spring and summer of 1977 by:

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LABORATORY SCIENCE

Unit I	Physical Measurement
Unit II	Physics
Unit III	Chemistry
Unit IV	Biology

512

Unit I- OBJECTIVES FOR PHYSICAL MEASUREMENT

PM-1 The student will be able to demonstrate his knowledge of the metric system, its units, prefixes and conversion factors.

PM-2 The student will be able to demonstrate his ability to measure accurately and interpolate linear measurements with a meterstick.

PM-3 The student will be able to measure volume with a variety of laboratory apparatus such as a meterstick, vernier caliper, micrometer caliper, overflow can and graduated cylinder.

PM-4 The student will be able to determine the mass of objects using laboratory balances.

PM-5 The student will be able to demonstrate his ability to make scales and plot and identify points on a graph.

PM-6 The student will be able to demonstrate the use of significant figures, exponents including powers of ten, and percent.

PM-7 Develop computational skills involving algebraic operations.

PM-8 The student will be able to demonstrate his ability to compute using scientific notation and compare relative sizes of numbers.

PM-9 Demonstrate his ability to derive general formulas for the area for specific classes of geometric configurations.

PM-10 Demonstrate his ability to derive general formulas for volume for specific classes of geometric configurations.

PM-11 Determine density of solids and liquids.

PM-12 Demonstrate his use of the thermometer by doing a variety of experiments such as calorimetry and freezing and melting.

PM-13 When given experimental, oral and/or written data, and the directions for implementation, the student will be able to demonstrate his ability to make a variety of measurements in the metric system and communicatate his findings within the accuracy of the instruments used.

OBJECTIVES FOR LABORATORY SCIENCE

Unit II Physics

1. Given an operational bell clapper (or any vibrating or rotating timer) and other basic materials the student will be able to produce a tape with dots representing the motion of his or her hand.

2. Given a paper tape with a series of dots representing the motion of a hand the student will be able to measure the distances between the dots to within ±1 millimeter. At least six intervals must be measured.

3. Given a table of interval distance and the interval time the student will be able to calculate corresponding interval speeds.

4. Given a piece of graph paper and a set of data the student will be able to construct and label appropriate scales which will accomodate the smallest and largest bits of data. (Students who have already been checked out on scale construction may skip this activity, or it can be done quickly as a review.)

5. Given a minimum of six values of interval speeds and the corresponding time intervals the student will be able to graph speed on the dependent axis against time intervals on the independent axis.

6. Given a graph of speed against time the student will be able to interpret the graph in terms of whether the speed is increasing or not changing at any specified point.

7. The student will be able to define acceleration as the rate of speed, and to calculate acceleration, given two successive interval velocities and the interval time.

8. Given a graph of speed against time the student will be able to predict values between data points (interpolation) and beyond the last data point (extrapolation), and discuss how these predictions compare with facts.

9. When given a metal dish, buret, meter stick, water, and support apparatus the student will be able to determine the acceleration due to gravity from falling water drops.

10. The student will define what a projectile is, describe its path and discuss its use.

11. Given a grooved plastic ruler and supporting materials the student will be able to construct a projectile motion apparatus.

12. The student will be able to construct a projectile motion apparatus and to predict the landing point of the object when it is launched horizontally, after being given a formula and the proper materials.

13. Given a graph of time vs. height the student will be able to calculate the horizontal speed of a projectile based on measurements of range and height.

14. When given a simple pendulum the student will be able to determine the relationship of its motion to the acceleration due to gravity.

15. When given a turntable and other necessary materials, the student will be able to calculate the acceleration due to gravity by using a rotating frame of reference.

16. The student will be able to define force as a push or pull.

17. Given a demonstration of a cart being pulled along with rubber bands the student will be able to state how acceleration of an object depends upon the force applied.

18. Given a demonstration of a cart with variable mass being pulled along with a constant force the student will be able to state how the acceleration of an object depends upon the mass of the object.

19. When given spring balances, string and gram weights the student will be able to demonstrate how two forces acting at the same point may be combined.

20. The student will be able to apply a rule to calculate the orbital period and speed of a rubber stopper being whirled around, given the radius of the orbit and a stop watch or sweep second hand watch.

21. Given the height of a satellite and its orbital period the student will be able to apply a rule to calculate the satellites' speed in a circular orbit.

OBJECTIVES FOR LABORATORY SCIENCE

Unit III Chemistry

1. The student will be able to identify and distinguish between physical and chemical changes and relate this to the structure of matter by using symbols, formulas and equations.

2. Given a periodic chart the student will be able to distinguish between physical and chemical changes and relate this to the structure of matter by using symbols, formulas and equations.

3. When given samples of each, the student will be able to identify and distinguish between solutions, suspensions and emulsions and those factors which affect them.

4. When given a group of compounds the student will be able to prepare solutions of a variety of concentrations and to compare solubilities of their components.

5. The student will be able to distinguish between metallic and non-metallic elements and identify metallic ions by using flame tests.

6. When given a group of solutions and a variety of indicators, the student will be able to identify and distinguish acids, bases, and salts and their relative pH.

7. The student will be able to identify and distinguish organic compounds when given the name, formula and/or functional groups.

8. The student will be able to develop an understanding that many organic compounds are synthesized by man and not restricted to living organisms by conducting experiments such as esterification, fermentation, distillation and polymerization.

9. The student will be able to develop skills in the correct use of laboratory equipment and experimental procedure by setting up, performing and communicating the results for a variety of experiments.

OBJECTIVES FOR LABORATORY SCIENCE

Unit IV Biology

1. Demonstrate the use and care of a compound microscope.
2. Demonstrate different methods of slide preparation.
3. Demonstrate correct techniques in handling various biological and laboratory apparatus.
4. Identify the cell as the basic unit of life and name the major structural parts such as, the nucleus, membrane, etc.
5. List the elements found in living things and organic compounds that supply these essential elements.
6. Given a food sample and necessary materials, apply the test for the presence of the following organic compounds: fats, proteins, sugar, starch.
7. Using samples of plants and animals, explain the importance of water to living things and decribe the relation to water to the volume of protoplasm in living things.
8. Using diagrams or apparatus, explain the process of diffusion and osmosis as it relates to the cell.
9. Identify and describe the major metabolic life functions in organisms (photo-synthesis, respiration, synthesis, nutrition, excretion, transport, regulation).
10. Describe the five levels of biological organization.
11. Identify structural differences and similarities of a variety of organisms.
12. Using pictures, dissecting techniques and other activities, identify internal and external structures of plants and animals.
13. Describe several characteristics used in separating organisms at the different levels of classification.
14. Given a variety of living and non-living things, apply a taxonomic key to classify them.

Laboratory Science
Biology
Senior High Level

15. Identify and describe the systems of the human body and explain their function.

16. Describe the physiological effects of specific drugs on the systems of the human body including barbituates, tranquilizers, narcotics, alcohol and nicotine.

17. Describe factors in the environment that are critical to life.

18. Expalin the importance of geochemical cycles for life.

19. Distinguish the interrelationships within a given environment.

20. Using diagrams or examples, observe and record precise data concerning growth in a population.

21. Describe nutritional relationships that are important biological factors in an enviornment.

22. The student will be able to use appropriate demonstration and laboratory activities to explore biologic and taxonomic organization, the major life functions and the interdependence of life in given environments.

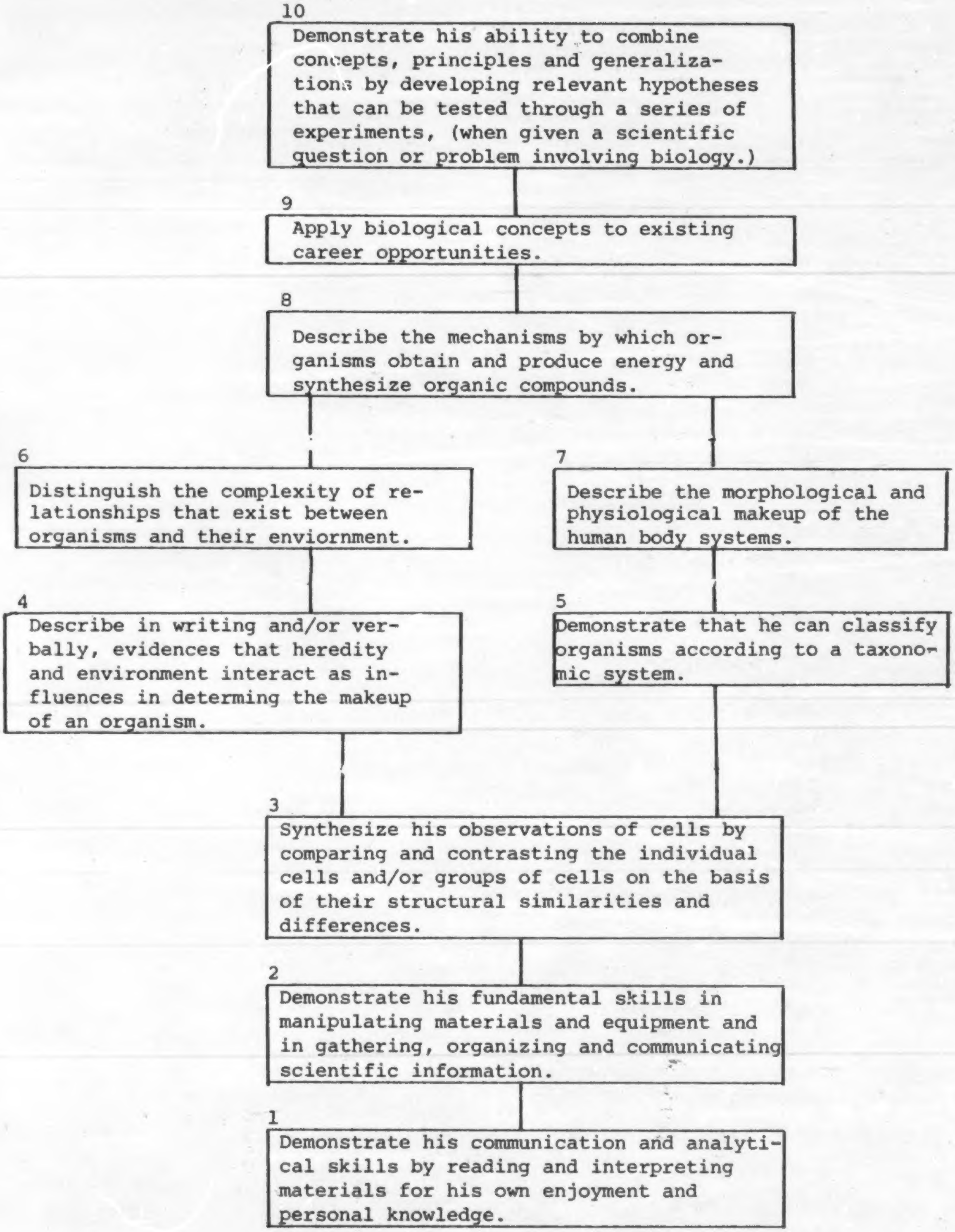
OBJECTIVES

FOR

BIOLOGY

OBJECTIVES FOR BIOLOGY

The student will be able to:



10 Demonstrate his ability to combine concepts, principles and generalizations by developing relevant hypotheses that can be tested through a series of experiments, (when given a scientific question or problem involving biology.)

9 Apply biological concepts to existing career opportunities.

8 Describe the mechanisms by which organisms obtain and produce energy and synthesize organic compounds.

6 Distinguish the complexity of relationships that exist between organisms and their enviornment.

7 Describe the morphological and physiological makeup of the human body systems.

4 Describe in writing and/or verbally, evidences that heredity and environment interact as influences in determing the makeup of an organism.

5 Demonstrate that he can classify organisms according to a taxonomic system.

3 Synthesize his observations of cells by comparing and contrasting the individual cells and/or groups of cells on the basis of their structural similarities and differences.

2 Demonstrate his fundamental skills in manipulating materials and equipment and in gathering, organizing and communicating scientific information.

1 Demonstrate his communication and analytical skills by reading and interpreting materials for his own enjoyment and personal knowledge.

OBJECTIVES FOR BIOLOGY

1. Demonstrate his communication and analytical skills by reading and interpreting materials for his own enjoyment and personal knowledge.

2. Demonstrate skill in manipulating materials and laboratory equipment and in gathering, organizing and communicating scientific information.

    a. Demonstrate his ability to handle laboratory apparatus in a skillful manner giving due attention to accident prevention.

    b. Demonstrate proficiency in the use of established scientific techniques.

3. Synthesize his observations of cells by comparing and contrasting the individual cells and/or groups of cells on the basis of their structural similarities and differences.

    a. List the contributions of each of the following to the cell theory: Hooke, Dujardin, Schwann, Schleiden, Brown, and Virchow.

    b. Compare and contrast structures of plant cells, animal cells and unicellular organisms.

    c. Identify the various organelles in plant, animal, and unicellular organisms.

    d. Prepare cells for observation with the microscope.

4. Describe in writing and/or verbally, evidences that heredity and environment interact as influences in determining the makeup of an organism.

    a. Describe the contributions of Gregor Mendel to our understanding of heredity.

    b. Distinguish between dominant and recessive traits.

    c. Contrast cultural with biological inheritance.

    d. Explain how mutations have helped some species adapt to their environment.

5. Classify organisms according to a taxonomic system.

   a. Identify the organisms found in your home using Linnaeus' system of taxonomy.

   b. Name and describe the seven biological groupings of Linnaeus' system of classification in order from the largest to smallest.

   c. Identify the similarities and differences among micro-organisms and their effect upon man and his environment.

   d. Classify various types of plants on the basis of their phyla and genus.

6. Describe several complex relationships that exist between organisms and their enviornment.

   a. List basic physical and biological factors that influence an ecosystem.

   b. Define community, ecology,and ecosystem.

   c. Identify those factors in a food web that help an ecosystem maintain stability.

7. Describe the morphological and physiological makeup of the human body system.

   a. Describe the major parts of each body system.

   b. Describe the functions of the major parts of the human body system.

8. Describe the mechanisms by which organisms obtain and produce energy and synthesize organic compounds.

   a. Describe the met obolic processes of organisms.

   b. Differentiate between anabolic and catabolic reactions.

   C. Describe how energy is obtained in cellular respiration.

9. Apply biological concepts to existing career opportunities.

a. List several careers related to biology.

b. Describe the effects of automation on job opportunities.

10. Demonstrate his ability to combine concepts, principles, and generalizations by developing relevant hypotheses that can be tested through a series of experiments, when given a scientific question or problem involving biology.

a. List in the proper sequence the principal processes of scientific investigation.

b. Differentiate between the principles of experimental design: problem, hypotheses, variables, data collection, data analysis, conclusion and inferences.

OBJECTIVES

FOR

CHEMISTRY

CHEMISTRY

Terminal Objectives

At the end of the first course in chemistry:

1. The student will be able to identify and utilize conventional laboratory equipment in performing the following basic laboratory procedures safely and skillfully.
    a. using gas burners
    b. transferring liquids and solids
    c. measuring mass and volume accurately
    d. filtering
    e. titration
    f. cutting and bending glass tubing
    g. inserting thermometers or glass tubing into rubber stoppers
2. Given a list of ten materials, the student will be able to classify each of them into one of the following classes: element, compound or mixture.
3. The student will be able to demonstrate his understanding of the significance of theories upon which modern chemistry is based by describing Dalton's atomic theory, and the modern atomic theory and describing the contributions of scientists such as John Dalton and Niels Bohr towards atomic structure.
4. The student will be able to demonstrate his knowledge of the mole concept by explaining the significance of atomic numbers, atomic weight, atomic mass, and the Avogadro number.
5. The student will be able to illustrate the arrangement of electrons for elements using the orbital, electron configuration, and electron-dot notation systems.

CHEMISTRY

6. The student will be able to discuss the origin of the currently used periodic table, describing its arrangement and explaining the periodicity of elements within the same group or period.
7. The student will be able to name correctly the chemical symbol for any specified element and to name the element which any given symbol stands for.
8. The student will be able to explain, illustrate and distinguish ionic, covalent, and coordinate covalent bonding in writing formulas using the electron dot diagram.
9. The student will be able to use and demonstrate mathematical skills in solving problems involving computation of percentage composition, emperical formulas, molecular formulas, weight-weight, volume-volume, weight-volume.
10. The student will be able to interpret, write, and balance formula equations.
11. Given the specific data, the students will be able to apply the laws governing the gaseous state of matter in solving problems of at least the following types: pressure, volume, temperature and density.
12. After interpreting the assumptions of the Kinetic Theory, the students will be able to differentiate between solids, liquids, and gases.
13. After completing laboratory investigations, the student will be able to describe the characteristics of solutions and these descriptions must include, at least, a statement about the concentrations of solutions (types), equilibrium, conditions affecting solubility, dissociation, electrolytes and non-electrolytes.
14. The student will be able to classify compounds as being acids, bases or salts, give some practical uses of each, and predict the outcome of reactions involving each.

15. The student will be able to solve problems involving ph, normality, molarity, titration and gram equivalent weight.

16. After collecting the specific data, the student will be able to describe colloids, suspensoids, and emulsoids. These descriptions should include a statement about: (a) Brownian movement; (b) Tyndall effect; (c) Surface area; (d) Electric charges.

17. After participating in career siminars and group discussions (small and large), the student will be able to list ten career opportunities in which the science of chemistry is required.

OBJECTIVES

FOR

PHYSICS

Physics

Terminal Objectives

At the end of the physics course each student will be able to:

1. Given the magnitude and direction of a resultant vector, the student will be able to resolve this vector into its vertical and horizontal components. (The direction maybe implied)

    a. An airplane flies 30° north of west at 500 mi/hr. At what rate is the plane moving (a) north (b) west?
    b. A ship sails from Norfolk harbor. It maintains a direction of 45° north of east for a distance of 100 miles. How many miles has the ship progressed from Norfolk (a) north (b) east?
    c. A street lamp weighs 30 lbs. It is supported by two wires making an angle of 120° with each other. What is the tension of each of these wires?

2. Given numbers written in common notation, the student will be able to express the se numbers in scientific notation.

    (a) 5800 (b) 186000 (c) 0.01 (d) 0.00079

3. Given problems of addition, multiplication, division and subtraction, the student will be able to calculate the solution using scientific notation.

    (a) $(2 \times 10^5) + (7 \times 10^4)$ (b) $(12 \times 10^{-2}) + (2 \times 10^{-3})$

    (c) $(8 \times 10^{-6}) - (4 \times 10^{-5})$ (d) $(4 \times 10^3) - (2 \times 10^2)$

    (e) $\frac{3 \times 10^1}{2 \times 10}$ (f) $\frac{1.6 \times 10^2}{10 \times 10^{-5}}$ (g) $(5 \times 10^2)\ (1.2 \times 10^{11}$

    (h) $(15 \times 10^{-3})\ (5 \times 10^5)$

4. Upon obtaining and recording data from quantitative experiments, the student will be able to graph the data, analyze the results and make extrapolations and interpretations based upon the plotted graph.

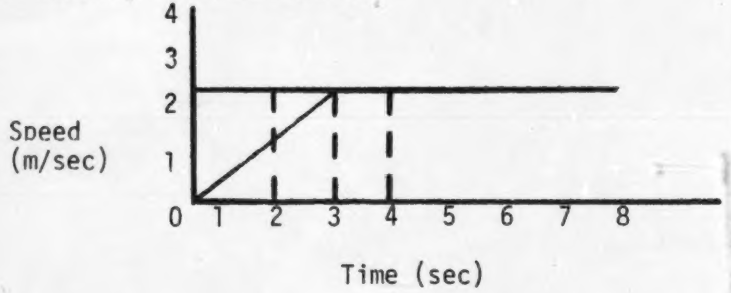
    (a) Graph the recorded data obtained from the experiment on Hooke's Law.
    (b) Explain whether the graphed data indicates that a steel spring obeys Hooke's Law.
    (c) Using the graph, determine the elongation of the spring for three forces that were not applied to it.
    (d) The pointer of a spring scale moves 2 centimeters when a mass of 100 grams is added to it. Apply the knowledge obtained from the graphed data to determine how many centimeters a 450 gram mass will cause the pointer to move.

5. Given the magnitudes and directions of two perpendicular vector quantities respectively, the student will be able to add and subtract the vectors, using either a diagrammatic or analytical method.

   (a) An airplane is traveling south at 300 Km/hr. There is a 100 Km/hr. crosswind from west to east. Determine the resultant velocity of the craft to the nearest Km/hr. and the nearest degree measured clockwise from north.
   (b) A person rowing a boat at 4 Km/hr. keeps the boat headed directly across a river which is flowing downstream at 3 Km/hr. Determine the resultant velocity of the boat.
   (c) A ship heads directly east from New York for 200 Km. To correct for an error in navigation, the ship then heads north for 50 Km. Add these displacement vectors to determine the total displacement up to that point.
   (d) An airplane flies 110 Km/hr. due west. The wind is 55 Km/hr from west to east. Determine the resultant velocity of the plane.

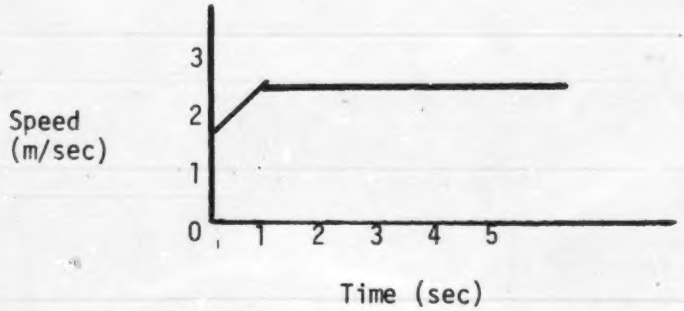
6. Given a two-dimensional straight line graph of a function, the student should be able to determine the slope of the graph at any point and explain the meaning of the result.

   (a)



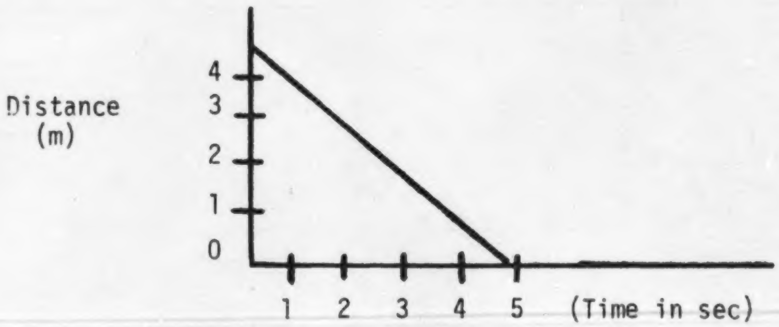
Determine the slope of the graph)-2 seconds, give the proper unit and explain the meaning of the result.

   (b)



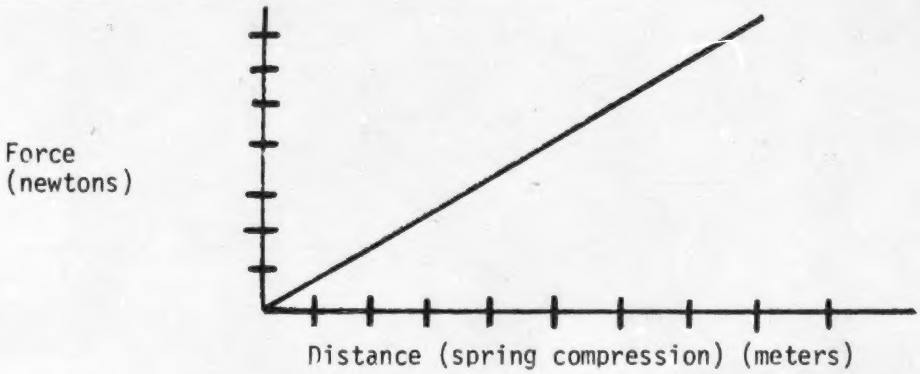
Determine the slope of the graph during the 3rd second, including units, and explain the meaning of the result.

(c)



Determine the slope of the graph between the 3rd and 5th seconds and explain the meaning of the result.

(d)



Determine the slope of the Force-compression graph. Include the unit in your answer.

7. Given an equation having four variables or less, three terms or less and of a degree no greater than two, the student will be able to solve the equation in terms of any of the variables included.

   (a) $V_f = at + v_i$
   Solve the above equation for the initial velocity (v_i)

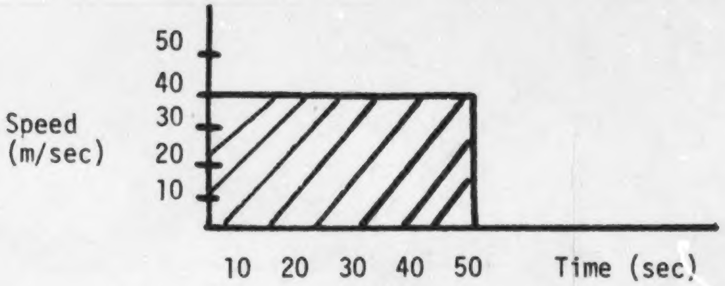
   (b) Solve the ouation $P + P_1 + (m_2v_2)$ for P_1

   (c) Solve the equation $\frac{1}{f} = \frac{1}{d_1} + \frac{1}{d_2}$ for $\frac{1}{d_1}$

   (d) Solve the equation $F = ma$ for a.

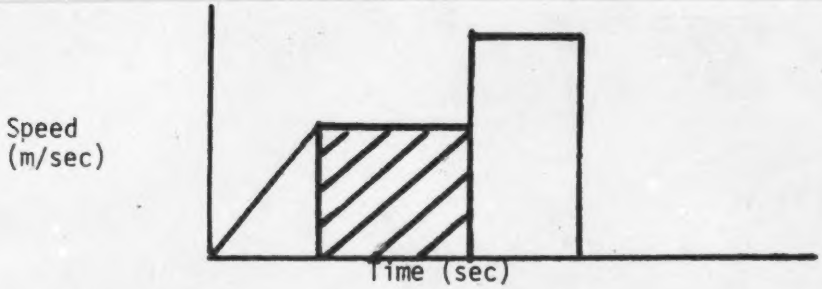
8. Given a two-dimensional straight line graph of a function the student will be able to determine the area under the graph within given limits, and explain the meaning of the result.

(a)



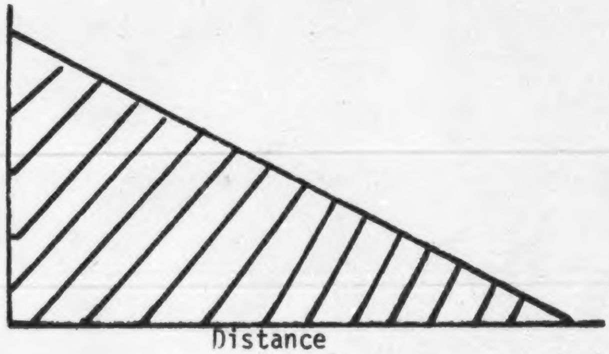
Determine the shaded area under the speed-time graph. Include the proper units in your answer. Explain the meaning of your result.

(b)



Determine the shaded area under the speed-time graph. Include the proper units in your answer. Explain the meaning of your result.

(c)



Determine the shaded area under the Force-Distance graph. Include the proper unit in your answer. Explain the meaning of your result.

APPENDIX

GLOSSARY OF TERMS*

Action Words

The following terms are used to designate observable behaviors which, when exhibited by students give evidence that the requested tasks have been successfully performed.

1. Construct	To make a physical object, a drawing or a written or verbal statement (such as an inference, hypothesis, or a test of any of these.)
2. Demonstrate	To perform a sequence of operations necessary to carry out a procedure.
3. Describe	To state observable properties sufficient to identify ab object, event, or relationship.
4. Distinguish	To select an object or an event from two or more which might be confused.
5. Identify	To select a named or described object by pointing to it, touching it, or picking it up.
6. Name	To specify what an object, event, or relationship is called.
7. Order	To arrange three or more objects or events in a sequence based on a stated property.
8. Apply a Rule	To derive an answer to a problem by using a stated relationship or principle.
9. State a Rule	To communicate, verbally or in writing, a relationship or principle that could be used to solve a problem or perform a task.

*The definitions for action words and the processes of science are quoted, with permission, from Guide for Inservice Instruction, Science...A Process Approach Program published by the American Association for the Advancement of Science, Miscellaneous Publication 67-9, Washington, D.C., 1967.

PROCESSES (SKILLS) OF SCIENCE

In science a strong emphasis is placed on developing the ability of students to employ the processes of science to learn about the natural phenomena around them. These same processes are used by scientists in pursuing their own investigations. Many of the processes are useful in other areas of study and in everyday life.

Students develop facility with the basic processes in the early grades, and move on to the more complex integrated processes in grades four through nine. In the laboratory science course the integrated skills are synthesized into a set of investigative practices which can be used in the life-long pursuit of solutions to problems.

Basic Processes

1. Observing - Using several of all of the senses...sight, touch, hearing, taste, and smell...to find out about an object. (Note. Unknown objects should not be tasted.) Quantitive (measured) observations are more precise than qualitative observations.

2. Inferring - Making an interpretation of an observation. If it is observed that a pond is frozen then we infer that the water temperature is below 0^{o} degrees centigrade. (Celsius)

3. Using Space/Time Relationships - Being able to describe the physical environment in terms of spatial relationships and changes with time. This includes shapes, symmetry, motion, rate of change in position, direction of change in position, and the measuring of time intervals.

4. Measuring - Choosing an appropriate measuring instrument, using it properly, recording the readings and carrying out calculations with the resulting data.

5. Communicating - To transfer information to someone elese by means of oral and written words, diagrams, maps, graphs, matematical equations, and visual demonstrations.

6. Classifying - To impose order on collections of objects or events. Biologists classify living things as plants or animals. Classification systems are used in everyday life for filing systems, telephone listings (classified ads), and personal activities such as shopping lists.

7. Predicting - Making a specific forcast of what future observations will be. Predictions are based on observations and inferences already made. For this reason they are different from making a guess.

Integrated Processes

1. Formulating Hypotheses - Hypotheses are statements of generalizations that include all objects or events of the same class. That are always based on observations or inferences. If it is observed that a dog sheds hair in the spring of the year, the generalization might be that all hair-covered animals shed in the spring. This deneralization (hypotesis) could be tested by observing as many other animals as possible.

2. Controlling Variables - When scientists conduct investigations or test hypoteses, they first identify all the variables they can and then design a procedure to control each variable. To get good evidence they *manipulate* in an orderly way the variable stated in the hypotesis and watch for corresponding changes in another variable called the *responding* variable. All other variables are *held constant* insofar as is possible.

3. Interpreting Data - This is a process useful in nearly all activities. The reading of books, newspaper, charts, graphs, maps, and pictures requires us to interpret. The attempt to find the meaning in data, in whatever form we collect it, leads to the construction of inferences, predictions, and hypotheses.

4. Defining Operationally - To state the meaning of a term in the context of one's own experience. The definition should state "what you do" and "what you observe" in the physical sciences. In life science the definitions are usually descriptive. These definitions are more useful to scientists are usually descriptive. These definitions are more useful to scientists and children than those in a dictionary. To define "mouse" as the tiny grey animal with fur and beady eyes that crawls through a hole in the wall may be more useful to children than saying that it is a small member of the genus Mus in the rodent family.

5. Expermenting - This is the cumulative process that includes all the other processes. To do an experiment it is necessary to make some observations, formulate a hypothesis , identify the variables which are present, decide which one is to be manipulated, construct a test with the othe variables controlled, collect and interpret the data, and decide whether the hypothesis is to be supported or rejected.